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ABSTRACT

Six of 11 papers presented at a symposium on language aptitude testing are included in this document. "Cognitive Abilities in Foreign Language Aptitude: Then and Now" (John B. Carroll) reconsiders language aptitude testing 30 years after publication of the Modern Language Aptitude Test (MLAT). "Preliminary Investigation of the Relationship Between VORD, MLAT, and Language Proficiency" (Thomas S. Parry and James R. Child) reports preliminary findings of correlational validity of a new language aptitude test. "Styles, Strategies, and Aptitude: Connections for Language Learning" (Rebecca L. Oxford) defines and differentiates between several interrelated cognitive constructs that also relate to successful language learning. "The Role of Personality Type in Adult Language Learning: An Ongoing Investigation" (Madeline Ehrman), discusses the relationship between language learning styles, preferred student learning strategies, and method of instruction used at the Foreign Service Institute. "Attitudes, Motivation, and Personality as Predictors of Success in Foreign Language Learning" (Robert C. Gardner) examines the literature concerned with the relation of two variables to second language achievement. "Predictors of Success in an Intensive Foreign Language Learning Context: Correlates of Language Learning at the Defense Language Institute Foreign Language Center" (John A. Lett and Francis E. O'Mara) describes how one measure (the Defense Language Aptitude Battery) is used to select learners of a particular language at the Defense Language Institute in Monterey, California. (MSE)

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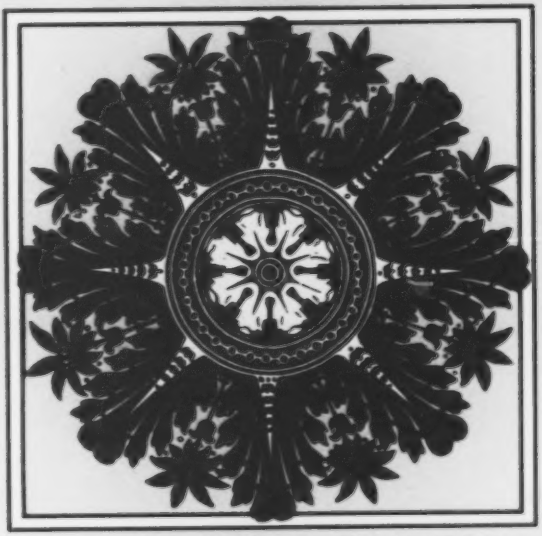

THOMAS S. PARRY
CHARLES W. STANSFIELD
EDITORS

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Language Aptitude Reconsidered

Thomas S. Parry
Charles W. Stansfield, Editors

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Thomas S. Parry
Charles W. Stansfield

Introduction

Thomas S. Parry & Charles W. Stansfield

At a time when language training requirements in the Federal Government are at an all-time high, and fiscal resources to conduct this training are becoming increasingly scarce, the accurate measurement of an individual's aptitude for learning modern foreign languages is of definite concern to many government agencies. For the Central Intelligence Agency (CIA), the National Security Agency (NSA), the Foreign Service Institute (FSI), the Federal Bureau of Investigation (FBI), and the Defense Language Institute (DLI), language aptitude assessment plays a significant role in selecting employees to participate in language training programs and in placing those participants at the appropriate level. Thus, it is not surprising that in the spring of 1987 the need to pursue a major new initiative in the testing of foreign language aptitude was discussed by the Interagency Language Roundtable (ILR), a group of representatives of all the government agencies involved or interested in foreign language training. This discussion led to a special session on language aptitude testing during the one-day conference for government linguists held prior to the 1987 Georgetown University Roundtable on Languages and Linguistics. Given the high level of interest demonstrated at that session, in May of 1987 the ILR decided to sponsor a special conference on language aptitude research and testing.

The rationale for such a conference was rooted in three urgent needs: the need for new measures of language aptitude, the need for a systematic research plan focusing on improving language aptitude measures, and the need for a careful review of language aptitude assessment applications within the government and the foreign language teaching profession as a whole.

Many members of the ILR acknowledge the need for new

instrumentation that will assess language learning aptitude more accurately and more completely than those currently in use. Some widely used instruments are becoming out of date; for example, the Modern Language Aptitude Test (MLAT) was developed and validated in the late 1950s, and the Defense Language Aptitude Battery (DLAB), in the early 1970s. Since then, knowledge of the human learning process and the objectives and methods of language training have changed considerably. The older aptitude measures do not take into account new insights revealed by cognitive psychologists into the human learning process in general, and the language learning process in particular. The time has come to rethink the whole notion of what constitutes an "aptitude" to learn foreign languages. The contribution of variables such as individual learning styles, personal learning strategies, and brain hemisphericity to the construct of foreign language learning aptitude needs to be examined in a systematic research plan.

The fact that the government is facing a shortage of linguists (individuals who are proficient in one or more foreign languages) makes the issue of assessing efficiently and effectively foreign language learning aptitude even more pressing for the Federal Government. Many career government employees able to speak one or more foreign languages fluently are either retiring or approaching retirement. This attrition of linguists is expected to continue for the foreseeable future. Unfortunately, the majority of those coming in to replenish the work force lack foreign language skills. This situation is already placing a burden on the government language schools to provide "catch-up" language training.

At the same time, fiscal resources to conduct this language training are becoming increasingly scarce. Facing this situation, the government must find the most effective means to screen and select those candidates with the best aptitude for learning foreign languages in order to obtain maximum productivity from language training monies. To accomplish this will require more sophisticated measures of foreign language aptitude than those currently available. The ability to identify potentially successful foreign language learners will need to be tailored to certain factors: (1) the language to be learned; (2) the language skill or skills (i.e., listening, speaking, reading, writing) to be learned; (3) the level of

proficiency to be obtained in training; and (4) the tasks for which the language skills will be used.

The ILR Invitational Symposium on Language Aptitude Testing was held on September 14-16, 1988, at the Foreign Service Institute Language School in Arlington, Virginia. Funding for the symposium was provided by the CIA, the DLI, the FBI, the NSA, and the U.S. Department of Education. The Center for Applied Linguistics (CAL) served as *secretariat* for the planning of the symposium. The organizational committee consisted of Thomas S. Parry (CIA), Madeline Ehrman (FSI), James R. Child (Department of Defense), Charles W. Stansfield (CAL), and Dorry M. Kenyon (CAL).

The number of symposium participants was limited to 65 and included representatives from government agencies, invited speakers from academia, and invited observers from the Educational Testing Service, the Public Service Commission of Canada, and CAL. Presentations were given by government employees and guest speakers. In addition, the symposium included two panel discussions: one on the description of current aptitude measures in use in government agencies, and the other on the role language aptitude testing plays in various agencies. Finally, there were meetings of three working groups that focused on applications of language aptitude testing, future research in language aptitude testing, and instrument design for language aptitude testing.

This volume contains six of the eleven papers presented at the symposium. Six papers were not included in the present volume. These papers (Bush, 1988; Jacobus, 1988; Leaver, 1988; Psotka, Swartz, Holland, & Hanfling, 1988; Todesco & Castonguay, 1988; Walker, Williams, & Navarrete, 1988) are included in the *further reading* section at the end of this introduction. One aptitude test description, presented during the first panel, has since been published and is also included in this section.

The volume begins with an article, *Cognitive abilities in foreign language aptitude: Then and now*, by John B. Carroll, whose research on language aptitude in the 1950s greatly improved our knowledge of the construct. For this symposium, Carroll was asked to reconsider language aptitude testing, now 30 years after the publication of his MLAT, with a view toward making recommendations on how to improve assessment of this cognitive ability. Although skeptical

about the possibility of greatly improving the MLAT, Carroll does offer some interesting observations on how one could make minor improvements to it. His observations concerning minor defects in the test are interesting, and of unquestionable validity, given that he is the author of the test. Even if the test is never revised by the publisher, his observations should be of use to researchers interested in using an enhanced MLAT as part of a research study, and to test administrators and score users. The major limitation of the MLAT, as Carroll sees it, is the unavailability of a second (i.e., parallel) form of the test.

In addition to minor improvements on the MLAT, Carroll proposes extending currently available language aptitude tests to several new domains of ability known to have predictive value, such as, grammatical sensitivity, rote memory ability, and inductive learning ability. This extension would be accomplished by refining discrimination among more broad abilities through the addition of new tests. In particular, he suggests a number of tests of auditory abilities that may be predictive of success in second language learning.

Finally, Carroll recommends further study of the cognitive operations involved in second language learning. He notes that an understanding of these operations could translate into the construction of test items that would be analogous to "work samples," in that they would reflect the operations that actually take place in learning a second language.

The paper by Thomas S. Parry and James Child, entitled *Preliminary investigation of the relationship between VORD, MLAT, and language proficiency*, reports on the preliminary findings of the correlational validity of a new language aptitude test called the VORD. VORD is the name of an artificial language; "VORD" means "word" in that language. Developed by the Department of Defense, the VORD requires examinees to learn an artificial language based on structural properties of Turkic languages. In their study, Parry and Child examined the correlational and predictive validity of the VORD by administering it and the MLAT to 36 subjects enrolled in a government language training program.

Students' scores on a self-assessment questionnaire and on end-of-course speaking and reading proficiency tests were also examined. Analysis of the data revealed that significant moderate corre-

lations exist between MLAT and VORD scores (r = .70) and that correlations between MLAT and VORD subtests ranged from low to moderate (r = .20 to .68). The correlation with learners' perceived language aptitude was .45. The VORD showed a correlation of .46 with end-of-training speaking proficiency and .35 with reading proficiency. These correlations were less impressive than those obtained using the MLAT. The study by Parry and Child is one of the few efforts to experiment with new measures of language aptitude during the last 15 years.

In her article entitled *Styles, strategies, and aptitude: Connections for language learning*, Rebecca Oxford defines and differentiates between several interrelated cognitive constructs that also relate to successful language learning. The major construct is language aptitude. *Learning style* (i.e., the learner's preferred mode of dealing with new information) subsumes a less influential construct known as cognitive style. *Cognitive style*, an individual's preferred or habitual mode of mental processing, is described as encompassing many cognitive traits. Among these traits are field independence-dependence, reflexivity-impulsivity, ambiguity tolerance, sensory modality preference, and cognitive complexity-simplicity. Oxford reviews the research on all of these traits and then discusses the interrelationships between styles and aptitude.

Oxford is equally comprehensive in her discussion of *learning strategies* (i.e., the steps taken by language learners to enhance any aspect of their accession, storage, retrieval, or use of information). Some learning strategies are a subcomponent of learning style while others are a subcomponent of cognitive style. Oxford classifies learning strategies into six groups: memory strategies, cognitive strategies, compensation strategies, metacognitive strategies, affective strategies, and social strategies. The first three of these directly involve language learning tasks. Oxford begins her review of the literature on learning strategies by discussing the good language learner. This review reveals that good language learners use a greater variety of strategies than poor learners, and use those strategies more frequently. Oxford then reviews the many factors that can affect the choice of a strategy. These include the language being learned, course level, degree of individual self-awareness, age, sex, attitudes, motivational intensity and orientation, personality char-

acteristics, language teaching methods, and task requirements. Oxford finds that cognitive strategies are more often used in learning a foreign language than metacognitive, social, or affective strategies, and she discusses the relationship between styles and strategies. Finally, Oxford discusses the implications of research on styles and strategies for improving our ability to predict success in language learning. She relates the implications of her research to the selection of individuals for language learning, and to the diagnosis/prescription process of current language learners.

The role of personality type in adult language learning: An ongoing investigation, by Madeline E. Ehrman, Director of Research at the Foreign Service Institute (FSI), discusses the relationship between language learning styles, preferred student learning strategies, and method of instruction used with Foreign Service Officers and other U. S. Government employees studying at the FSI. The model used is Carl Jung's typology of conscious functioning as operationalized in a personality measure, the widely known Myers-Briggs Type Indicator (MBTI). Ehrman is certified to administer and interpret the MBTI and is thus in a unique position to discuss its possible applications to the language learning environment. The MBTI classifies an individual's personality on four bipolar dimensions. These dimensions are related to preferred activities, ways of approaching problems, interaction with other people, and general behavior. Ehrman's qualitative evaluation of the relationship of these dimensions to the formal language learning context provides useful insights to language learners, teachers, and researchers. It also helps us glean a better understanding of the construct of psychological type, which appears to function in a parallel manner to the construct of language aptitude. Both constructs have implications for the language learner, the learning environment, and the learning outcomes.

Robert C. Gardner, in his paper entitled *Attitudes, motivation, and personality as predictors of success in foreign language learning*, examines the literature concerned with the relation of two variables, attitudes/motivation and personality characteristics, to achievement in a second language. Based on his review, Gardner concludes that there is little evidence for a significant relationship between personality traits and second language acquisition. On the other hand, the

evidence indicates a clear relationship between attitudinal/motivational characteristics and second language acquisition. In considering the poor results of possible personality correlates, Gardner speculates that this could be due to the fact that researchers generally do not construct their personality measures in relation to the language learning context. Measures of anxiety, for example, do not relate consistently to achievement in a second language. However, measures of language classroom anxiety and language use anxiety do relate to second language achievement.

Gardner summarizes the research literature on attitudes and motivation. His summary demonstrates that attitudes and motivation together form one variable class that is relatively independent of language aptitude. Both attitudes/motivation and aptitude are consistent correlates of second language achievement. In combination they predict second language achievement fairly well (about .35 and .40 respectively). This attitudinal/motivational variable, Gardner points out, is comprised of three separable components: degree of integrative orientation (the desire to affiliate with the target language community), attitudes toward the learning situation, and motivation to learn the language.

In discussing attitudinal/motivational research, Gardner makes an important distinction between common and idiosyncratic "causes" of second language achievement, and emphasizes that because research can deal only with the common causes, prediction will always be somewhat restricted.

In the final section of his paper, Gardner directs readers' attention to some measurement and design problems associated with research on the prediction of language learning success. He notes that while aptitude measures are quite lengthy, attitudinal measures typically contain only a few items. This results in the reduced reliability of the attitudinal measure and a concomitant subsequent reduction in the magnitude of any expected correlation with achievement. He also notes that though sample size is often a problem in such studies, this can be overcome by merging classes; however, a number of cautions are warranted whenever classes are merged.

John Lett and Frank E. O'Mara, in their article entitled *Predictors of success in an intensive foreign language learning context: Correlates of language learning at the Defense Language Institute Foreign Language*

Center, describe how the DLAB as a foreign language learning aptitude measure is used to select learners of a particular foreign language at the Defense Language Institute (DLI) in Monterey, California. The DLI and other government agencies have classified all languages into four categories, according to their difficulty for English-speaking adult learners. A minimum DLAB score is associated with each language category. The data that show rates of success and attrition demonstrate the utility of a language aptitude measure.

Lett and O'Mara also describe a major study of variables associated with foreign language acquisition and attrition at the DLI. These variables included general intellectual ability as measured by the Armed Services Vocational Aptitude Battery (ASVAB); the demographic variables of sex, level of education, and age; brain hemisphericity as measured by left or right handedness; prior experience learning a foreign language as measured by a language background questionnaire; attitudes and motivation as measured by a variant of Gardner's Attitudes and Motivation Index; learning strategies as measured by Oxford's Strategy Inventory for Language Learning (SILL); personality and cognitive style as determined through measures of ambiguity tolerance; field independence and extraversion; and language aptitude as measured by the DLAB.

Data based on three other measures of cognitive abilities, the Watson-Glaser Critical Thinking Appraisal, Flanagan's Industrial Test of Memory, and Flanagan's Industrial Test of Expression, were also collected. This large and complex database was analyzed through multiple regression analysis. The results showed that language aptitude was more important for success in difficult languages than in comparatively easy ones. General ability and other cognitive abilities also played strong roles. Attitudes and motivation, particularly when measured several weeks into training, also served as significant predictors. The use of a variety of learning strategies also was a significant predictor of successful language learning. This important study provides a glimpse at the complexity of the task of improving the prediction of successful language acquisition.

While language aptitude tests are commonly used in the government, they are rarely used in academia, despite the fact that they may have some diagnostic/prescriptive value in the academic context.

The authors hope that this volume will generate a new discussion of the construct of language aptitude and the prediction of successful language learning in both government and academia.

June 1989

Further Reading

Bush, M. (1988, September). *The personality and attitudinal dimensions of language aptitude*. Paper presented at the ILR Invitational Symposium on Language Aptitude Testing, Arlington, VA.

Jacobus, F. (1988, September). *The relationship between cognitive development and foreign language proficiency*. Paper presented at the ILR Invitational Symposium on Language Aptitude Testing, Arlington, VA.

Leaver, B. (1988, September). *Enrollment management in foreign language programs: The comparative value of language aptitude and brain hemisphericity*. Paper presented at the ILR Invitational Symposium on Language Aptitude Testing, Arlington, VA.

Psotka, J., Swartz, M., Holland, M., & Hanfling, S. (1988, September). *Cognitive models of students' language structure: The view from intelligent computer assisted instruction*. Paper presented at the ILR Invitational Symposium on Language Aptitude Testing, Arlington, VA.

Stansfield, C. W. (1989). Review of the Pimsleur language aptitude battery. In D.J. Keyser & R.C. Sweetland (Eds.), *Test critiques* (Vol. VII, pp. 438 - 445). Kansas City, MO: Test Corporation of America.

Todesco, A. & Castonguay, T. (1988, September). *The uses and limitations of aptitude testing in the language training program of the public service commission of Canada*. Paper presented at the ILR Invitational Symposium on Language Aptitude Testing, Arlington, VA.

Walker, M., Williams, M., & Navarrete, O. (1988, September). *Aptitude and language learning of FBI special agents*. Paper presented at the ILR Invitational Symposium on Language Aptitude Testing, Arlington, VA.

1

Cognitive Abilities in Foreign Language Aptitude: Then and Now

John B. Carroll

Speakers at the ILR Invitational Symposium on Language Aptitude Testing addressed the question of whether it might be possible to improve current methods of predicting success in foreign language learning, and of using the data from such predictions in selection, placement, and guidance of students. One thought in addressing this question is this: What's wrong with current methods? Are they far enough from providing useful predictions that it would be worth the effort, expense, and time it might take to improve them? Are data from predictions provided by tests and other instruments so questionable and difficult to use that fundamental changes need to be made in producing and handling those data? Are there problems of fairness and possible test bias that are not adequately considered?

Participants in the ILR conference can surely render opinions on these matters based on many years of practical experience in using the Modern Language Aptitude Test, the Defense Language Aptitude Battery, and other aptitude instruments used for selection and placement of potential foreign language learners and used for diagnosis of learning difficulties. Although suggestions can be made for new research and development, it is necessary to demonstrate the need for change. The very fact that this conference was convened provides some hint that there may be some dissatisfaction with present predictive procedures, but it remains to be seen how grave this dissatisfaction may be.

To be sure, although the validity of currently available foreign language aptitude instruments has been amply demonstrated, it is conceivable that even better validities could be secured through a program of research. It also is conceivable that as research has progressed, the curve of validities has approached an asymptote that would be very difficult to break through. The success of at least one program in which currently available aptitude instruments were used in every phase of selection, placement, and diagnosis has been impressive, and it is difficult to believe that that degree of success could be very significantly enhanced through further research. One can look at the program described by Marjorie Wesche (1981) in which the Public Service Commission of Canada used the MLAT, the Pimsleur Language Aptitude Battery (PLAB), and a white noise hearing test (a *white noise* test makes use of a controlled application of constant background noise) to develop profiles whereby adult learners of French were placed in one of three types of language training programs. The program selection was dependent upon aptitude profiles and various types of questionnaire and interview data. Wesche's tables of results show that streaming by aptitude profiles was extremely successful in predicting rates of learning success in this Canadian program. I do not know whether similar success with aptitude measures has been achieved in various U.S. government and military programs, but it has been my assumption, for some years, that the degree of success has been acceptable or more than acceptable. In view of this, I return to my query: What's wrong with present methods? Do they require just "fine tuning," or is some more radical change called for?

Consider first the MLAT as it has existed for more than 25 years. Although there is nothing "dated" about it, surely there ought to be an alternate form or two. I am embarrassed to say that I have not provided one. I imagine that those who give the test must be utterly bored with doing so; an alternate form would provide at least some mild relief. A revision of the test would also permit retesting individuals, and provide some degree of protection from contamination of the validity because of leakage of information about the form. Further, the availability of an alternate form would be useful in certain kinds of research, such as investigating effects of language training on aptitude test scores, or in comparing methods of lan-

guage training.

There are a number of minor defects in the MLAT that could be fixed. For example, the Number Learning section contains an unfortunate correspondence between the numbers and the alphabetical order of their names. Part II, Phonetic Script, typically has a negatively skewed distribution, a fact that suggests that the test is too easy for the majority of subjects, and thus is not sufficiently discriminating at upper levels of ability. The instructions for Part III, Spelling Clues, are not clear to some subjects and fail to emphasize sufficiently the speeded nature of the test. Perhaps there are similar minor defects in Parts IV and V.

Other currently available aptitude tests could stand minor improvements, and alternate forms of them could be generated and standardized. Consideration might be given to lengthening the tests so that the subtests would have higher reliability coefficients, particularly if they are to be further used in developing profiles of learners' abilities. Standard test construction and item analysis procedures would be used to perfect these tests as much as possible. At the same time, it must be realized that improving subtest reliabilities might entail considerable lengthening of the tests; such lengthening may not be practical or desirable, in view of possible limits in time that can be allocated for testing.

An effort should also be made to formalize and objectify the procedures whereby interviewers and counselors, as in the Canadian Public Service Commission (PSC) program described by Wesche (1981), make placements of students into aptitude streams and classes of particular teaching methodologies. Such placements could be made by a computerized algorithm, and would be more valid and effective than the placements that are now made with some subjectivity. The only disadvantage in using a computerized algorithm might be that some of the personal touch conveyed by the interviewers and counselors would be lost, but this disadvantage could be offset by the increased efficiency of the system and the increased time that counselors would have to attend to student learning difficulties.

New Light on the Components of Foreign Language Aptitude

Since 1959, the publication date of the MLAT, there has been considerable research that throws light on the components of foreign language aptitude and that provides information that might be useful in revising this and other batteries of foreign language aptitude tests.

For the most part, this research has not suggested any major change in the components of foreign language aptitude that have been recognized from the start. Here, the components are collectively called the following:

- Phonetic coding ability
- Grammatical sensitivity
- Memory abilities
- Inductive language learning ability

The research has suggested ways to refine the specification and definition of these abilities, and how they can be better measured. To follow are comments on each of these abilities individually, but first there is another category of abilities that has become evident, partly as an outgrowth of a more refined analysis of phonetic coding ability.

Auditory Abilities

In the Canadian Public Service Commission program as described by Wesche (1981), it became useful to distinguish auditory ability from phonetic coding ability in the diagnostic process. This appears to be, actually, mainly a matter of hearing loss—usually mild, of the sort that can occur in older populations. The PSC population is stated to have an average student age of 36 years and a range up to 60 years. Thus, as Wesche notes, "partial hearing loss which can interfere with classroom performance is a common problem" (Wesche, 1981, p. 129). Initially, potential hearing loss problems were identified as being indicated by low scores on two of Pimsleur's tests, Sound Discrimination and Sound-Symbol Association. Further, "a candidate with a low score on both these PLAB tests

will almost always have a confirming low score on the two MLAT subtests based on auditory tasks: I, Number Learning, and II, Phonetic Script"(Wesche, 1981, p. 129). When possible hearing loss is indicated, a special Auditory Ability Test is administered. In this test that uses white noise masking—a test developed and standardized for the PSC population—the candidate identifies nonsense English words and phrases. Sometimes, also, a standard audiometric test is administered.

Test results indicating hearing loss, particularly a loss for high pitches, could affect choice of personnel for foreign language training. In the PSC program, special arrangements were made when persons with mild hearing losses were admitted to training; seating was arranged close to the instructor.

Hearing loss may not be the only factor involved in auditory ability. Various researchers have shown that regardless of differences in hearing, there are individual differences in the ability to understand speech when the speech is unclear, or accompanied by masking sounds. Stankov and Horn (1980) identified several special auditory ability factors. One of these was interpreted as Speech Perception Under Distraction (SPUD) and was measured by such tests as the following:

Talk Masking: The task was to write isolated words spoken by one voice in the midst of increasingly loud, continuous talking by another voice.

Cafeteria Noise Masking: The task was the same as that of Talk Masking except that the background noise was that of a cafeteria.

These authors identified several other special auditory ability factors that might be useful in foreign language aptitude testing, for example Temporal Tracking (Tc), an ability to recognize and remember the order in which particular sounds occur. The sounds could be notes of particular pitches, nonsense syllables, or voices. Other factors of possible interest were called Maintaining and Judging Rhythm (MAJR) and Discrimination among Sound Patterns (DASP). Details about tests associated with these factors are included in Stankov and Horn's report, and in several other articles

concerning auditory tests (Horn & Stankov, 1982; Stankov, 1986). It is possible that these factors are already measured, to some extent, by subtests of the MLAT or the PLAB, but tests of the factors identified by Stankov and Horn should be included in a research program to investigate the degree to which they overlap with current foreign language aptitude tests and the degree to which they might contribute new predictive information.

Phonetic Coding Ability

I stated the following in an article published some years ago:

> Phonetic coding ability is apparently clearly represented by MLAT-II, Phonetic Script, a test that requires examinees to identify relationships between English sounds (presented auditorily in nonsense syllables) and a phonetic transcription that is normally unfamiliar to them (actually the Smith-Trager transcription that is familiar to many linguists). It is also probably represented in one or two subtests in the PLAB: PLAB-5, Sound Discrimination, requiring differentiation of Chinese syllable tone patterns and identification of them with meanings, and PLAB-6, Sound-Symbol Association, a test requiring subjects to identify proper spellings of tape-recorded nonsense words, such as, /tarpdel/ spelled as *tarpdel* rather than *tarpled*, *trapled*, or *trapdel* (Pimsleur, 1963). I have reported studies (Carroll, 1962) showing that tests of sound discrimination as such are not predictive of foreign language success. Pimsleur's Sound Discrimination test probably derives its validity from the fact that after identifying the tone patterns—a task that will be relatively easy for English speakers, because the tone patterns are analogous to meaning-bearing pitch patterns in English—the subject has to associate them with meanings and retain these associations while performing the test. The association of particular sound patterns with meanings may be regarded, therefore, as a form of phonetic coding. The association of Pimsleur's Sound-Symbol Association test with phonetic coding is less clear, but the association may derive from the fact that

> persons high in phonetic coding ability usually have much more accurate perceptions of orthographic conventions in English.
>
> (Carroll, 1981, p. 107).

In recent years, I have had further thoughts about the nature of phonetic coding ability, although these thoughts have not stimulated me to propose alternate ways of testing it. One thought is that phonetic coding ability is closely related to the problems experienced by persons who have or have had the syndrome commonly called dyslexia (i.e., difficulty in learning to read that is not explained by low intelligence or sensory deficiencies). Dyslexia begins in childhood with difficulties in segmenting speech into words, syllables, and phonemes, and in associating such segments with graphemic counterparts. Difficulties in learning to read and spell ensue. Eventually reading may be mastered, to a degree, but the spelling problems usually persist. Although the spoken form of the native language is acquired more or less normally, this is far from the case for the written language.

There is evidence that dyslexics confront special problems in learning a foreign language at school, whether as children in the primary grades, or later on, as adults in formal courses. The difficulties center, as before, in segmenting language units, forming auditory concepts of those units, and manipulating their order in mimicking foreign language sounds. A test like the Phonetic Script portion of the MLAT or the Sound-Symbol Association subtest of the PLAB presents problems with which these dyslexics, or former dyslexics, can deal only with much difficulty because they require perceptions of language segmentations and their correspondences with graphemic symbols. These difficulties carry over into foreign language learning activities—mimicking sounds accurately, learning the segmentation and spelling of foreign words, and controlling the order in which phonemic units are uttered. This can be one reason why phonetic coding tests turn out to be highly valid in many foreign language learning situations. Whether they are valid in all foreign language learning situations is something of which I am not certain; experience with different teaching methods in the Canadian

PSC program suggests that some people with low phonetic coding ability, at least as measured by written tests, can succeed well with programs that emphasize analytical skills and that do not put a high premium on phonetic coding. (Wesche notes that phonetic coding ability is essential for success in the audio-visual method, but apparently it is not essential in the analytical method.)

In an unpublished study in which I attempted to determine the nature of phonetic coding ability as measured by the Phonetic Script test, results indicated that scores on this test were a function of at least three factors: (1) general intellectual ability; (2) a phonetic coding ability that was exhibited in various other tests of audiovisual functioning, including the Spelling Clues test; and (3) some sort of memory factor whose nature was difficult to determine from the data available. Insofar as the Phonetic Script test is a learning task, this finding makes sense, because as examinees proceed through the test, what they are able to learn depends at least in part on their memory for materials previously encountered. In any event, it seems clear that the Phonetic Script test is complex; perhaps that is partly responsible for the high validity usually found for it. That is, I assume that both of the special factors it measures tend to be involved in foreign language learning—both phonetic coding ability as previously defined and a special type of memory for phonetic material. These tentative findings would need to be borne in mind in planning further research on phonetic coding ability and on other factors apparently measured by the Phonetic Script test. An effort to measure the underlying factors in the Phonetic Script test separately from each other, and to determine whether they are differentially valid, would be desirable.

The possible association of poor phonetic coding ability with dyslexia would suggest that neuropsychological studies be made of low scorers on phonetic coding tests, and that some types of neuropsychological examinations often used with dyslexics might contribute to predictions of foreign language success. Telzrow (1985) classifies dyslexics into three types—auditory-phonetic, visuospatial, and mixed, and characterizes each type in neuropsychological terms. Other chapters in the book (Hartlage & Telzrow, 1985) in which Telzrow's contribution appears, as well as a chapter by Goodglass and Butters (1988), give suggestions about neuropsy-

chological examinations that might be appropriate in research on phonetic coding ability. Probably Telzrow's auditory-phonetic type of dyslexic is the one most likely to be poor in phonetic coding ability as it applies in foreign language learning.

Grammatical Sensitivity

I have never had regrets or second thoughts about the method of measuring grammatical sensitivity that is used in the Words in Sentences test of the MLAT. This is a grammatical analogies test in which, for each item, the examinee is asked to find a grammatical construction, in one or more English sentences, that has a function analogous to that of an indicated word or phrase in a key sentence. I interpret high scores as demonstrating an awareness of the syntactical patterning of sentences in the examinee's native or well-learned language and of the grammatical functions of individual elements in a sentence. The difficulty of the task does not stem from difficulties in analogical reasoning as such; rather, it stems from subtleties in the structure of English sentences such that attractive distractors can be found for multiple-choice items. In the original construction of the test, considerable effort was put into writing and trying out possible items. Items appearing in the test were items that were found to have high discriminating power. They are presented in the order of their empirical difficulty values, and enough time is allowed to permit nearly all examinees to try every item. It is thus a "power" test rather than a "speed" test. Some linguists may argue about whether all the answers keyed correctly are actually analogous to the constructions in the key sentences, but the answer key was verified in terms of both internal and external validity (i.e., satisfactory biserial correlations both with total test score and with measures of foreign language learning success).

There is nothing in the test that requires technical knowledge of grammatical structure or terminology, but in a sample of University of North Carolina undergraduates, scores on the test correlate substantially (r = .76 to .78) with tests of technical grammatical knowledge. Yet, the scores correlate only moderately (r = .36 to .41) with self-ratings of knowledge of grammatical functions, sentence diagramming, and the like; in fact, self-rated grammatical knowledge constitutes a factor separate from the grammatical sensitivity

factor on which MLAT-IV loads most highly (its loading is .80). On that factor, incidentally, there are fairly high loadings (.58 and .50, respectively) of the Quantitative and the Verbal sections of the Scholastic Aptitude Test, a fact from which one can infer that MLAT-IV is a fairly good test of general intelligence, or at least that persons high on MLAT-IV are likely to be above average in intelligence. Nevertheless, there seem to be some individuals who get high scores on the test without having had formal training in grammar, and there are some highly intelligent persons who get low scores on the test.

My only suggestion about the domain of grammatical sensitivity is that scores on tests of formal grammatical knowledge and terminology might be revealing for comparisons with MLAT-IV scores. That is, they should be studied as possible moderating variables or as statistical controls for amount of formal training in grammar. A person who does well on MLAT-IV without formal school training in grammar should be an especially good language learner. There have also been suggestions that the instructions for MLAT-IV might be improved and clarified.

Memory Abilities

It is incorrect to regard MLAT-V, Paired Associates, as a measure of general memory. More strictly, it is a measure of a special kind of rote-learning ability that appears to function in foreign language learning situations. I have never been as confident about its validity as I have been about that of MLAT-II, Phonetic Script, and MLAT-IV, Words in Sentences. In my investigations leading to the MLAT, the validities of the paired-associate test fluctuated widely over different samples, all the way from zero validity to quite substantial validity. The Paired-Associates test was allowed to appear in the MLAT because I thought the odds were that it would have good validity in at least some foreign language learning contexts, and that scores on this test might be diagnostically useful. Just what factors appear to control its validity or nonvalidity have not been determined. This is a problem that needs to be investigated in future research.

It is noteworthy that the Canadian PSC program regarded memory ability in the following way:

> [A] separate diagnostic factor because of its apparent differential relation to success in the various instructional approaches. It is not important for effective learning with the Analytical Approach, but appears to be so for the Functional Approach.
>
> (Wesche, 1981, p.133)

Wesche further points out that memory ability appears not only in MLAT-V, Paired Associates, but also in MLAT-I, Number Learning, and that individuals use varied strategies in dealing with memory tasks both in these tests and in actual language learning contexts. This observation implies that the MLAT subtests yield only gross appraisals of memory performances; much more detailed testing and observation, possibly individualized, might be necessary to obtain measures more useful in prediction, placement, and diagnosis. The investigation of memory performances is currently an active area of cognitive psychology (Richardson-Klavehn & Bjork, 1988), and I can only recommend that research in foreign language aptitude attend closely to the directions of this research.

In my previous review of foreign language aptitude research (Carroll, 1981), I mentioned the work of Underwood, Boruch, and Malmi (1978) in studying what they called the composition of episodic memory. I regard their study as one of the most comprehensive in the field, and I have reanalyzed the correlation matrix on which their conclusions were based. My reanalysis can now be found, as an illustration of factor-analytic procedures, in a chapter I wrote (Carroll, 1988, p. 340) for the second edition of Stevens' *Handbook of experimental psychology*. As my analysis indicates, paired-associate memory is only one of the factors that can be distinguished in this domain, which is covered by a "general (episodic) memory factor" that also includes factors of free recall learning, memory for episodic events, verbal discrimination learning, and (weakly) memory span. Yet, episodic memory is only one form of memory. Underwood et al. did not use memory tests involving foreign-

language-like stimuli, but I would presume that the paired-associates test in MLAT-V would structure itself factorially with the paired-associate learning factor found in Underwood et al. If I were to undertake a new study of memory abilities in foreign language aptitude, I would want to include the variety of tests suggested by Underwood et al., and other kinds of memory tests now being studied in cognitive psychology. Tests of delayed memory might be of particular use.

Inductive Language Learning Ability

This ability is that of being able to induce rules governing given stimulus material, especially those presented by materials in a foreign language. Let me repeat what I said about this ability in my previous review:

> This ability is represented only weakly in the MLAT, possibly in MLAT-1, Number Learning. More valid tests of this ability that were developed in the research program that I conducted in the 1950s with Stanley Sapon proved to be too long and difficult to administer to make it feasible to include them in the battery. In available batteries it is probably best represented in PLAB-4, Linguistic Analysis (see Pimsleur, 1963). It is probably well represented in the DLAB (Petersen and Al-Haik, 1976), most parts of which appear to require the examinee to infer language rules from systematically varying language materials. I am unaware of any studies which have attempted to study this ability from an experimental point of view.
>
> (Carroll, 1981, p. 109)

This ability is probably substantially correlated with the inductive factor that has appeared in numerous factor-analytic studies of cognitive ability, using tests that do not necessarily involve foreign-language-like stimuli. Research should investigate this relationship further, but in predicting foreign language success it will probably be wisest to use foreign language materials as the basis for the tests.

One of the tests that Sapon and I developed was called Tem-Tem

Learning (Sapon, 1955). It involved presentation of visual slides accompanied by taped-recorded auditory stimuli and was an effort to simulate foreign language learning (of an artificial language) by an audiovisual method. At the time, the test was exceedingly cumbersome to administer because the technology used in doing so was primitive, at least by today's standards. It would be an easy matter to project this test into a contemporary microcomputer with graphics and auditory capabilities, and I would encourage an effort to do so. (I can supply copies of the slides, tapes, and other test materials for anyone caring to try this.)

Other Potentially Useful Abilities

Of late, I have been turning my attention to surveying the complete spectrum of cognitive abilities, particularly as they appear in factor-analytic studies conducted over the past 60 years or so. Preliminary findings have been published in several places (e.g., Carroll, 1987b, 1988; Snow, 1986). My intent has been to specify which factors of cognitive ability can be identified consistently and replicably, and to interpret these factors in terms of what we know about cognitive processes and attainments. I am not sure, at this point, what value my extensive lists would have for further research in foreign language aptitude. There is almost an *embarras du choix*; it seems likely that something like 50 or more factors will turn out to be confirmable. One approach would be to investigate as many factors as possible as potential predictors of foreign language training success, but this might be criticized as an unbridled and extravagantly expensive exercise in rank empiricism. A more selective approach might be recommended, but the criteria for selectivity would be difficult to specify; selection of predictors would have to be based on questionable hunches and speculation. In my early research (Carroll, 1962), I had already explored many of the better-known factors as possible predictors, and with some exceptions these speculations proved to be incorrect or inconclusive. For example, tests of various *verbal fluency* factors turned out not to make significant contributions to prediction. (*Fluency* factors are those involving tests of the ability to name or write, in a limited time, as many ideas as possible on a given topic or semantic category.) The present form of the MLAT was an outcome of empirical findings on

a rather large number of possible predictors, in the sense that it focused on those components of ability that proved to have good powers of predicting the criteria of language learning success that I had available.

It is possible that the present situation in foreign language education and training is different from what it was in the 1950s and early 1960s when I conducted my original studies. Training methods may be different, and criteria of successful performance may be different. Actually, what these differences are would have to be demonstrated; I, for one, would have to be convinced that they are significantly different. But on the supposition that there are significant differences, a new approach to prediction on the basis of what is now known about cognitive factors of ability might be attempted. Perhaps verbal fluency and idea production factors would show validity; perhaps even factors of spatial ability would be useful in prediction, although that seems unlikely because it is difficult to conceive that such factors would be relevant in learning languages. Rather, I believe, research should concentrate on the refinements that have come about in the measurement of factor domains already shown to have predictive utility. One example would be the auditory domain, as discussed above. Another would be the memory domain.

We can now, perhaps, take a broader view of the criteria for language learning success. In most of my research on foreign language aptitude, the criterion has been, essentially, rate of learning a language "from scratch," up to S2/R3 levels on the FSI scale. There is obvious reason for this: Individuals predicted to have substantial difficulty in attaining the S2/R3 levels can hardly be considered for selection even though they may be brilliant performers at higher levels after they have moved beyond the S2/R3 levels. For example, it is possible that such an individual might be an excellent translator or a facile simultaneous interpreter by virtue of special abilities that do not come into play in early language learning stages but that do come into play at later stages. In my research, high verbal ability (as measured by vocabulary and reading comprehension tests) was generally not a good predictor of early language learning success, but it is possible that it would be a good predictor of success in reaching higher levels of proficiency. Similar findings might be

made for other abilities that are not good predictors of early success.

This immediately suggests that research might focus on abilities that would possibly be relevant in the later stages of foreign language attainment. There should be research, using samples of individuals who have already reached the S2/R3 levels, to investigate the extent to which new tests might predict success in mastering higher levels of foreign language performance, or in acquiring skills, like translation and simultaneous interpretation, that can become important after a foreign language has been acquired.

Cognitive Processes in Foreign Language Learning

Over the last quarter of a century, there has been a "cognitive revolution" in psychology (Baars, 1986) whereby this science has sought a framework that does not depend solely on theories of stimulus-response relationships, or on behavioristic propositions. Attention has turned to the mental operations that are supposed to occur as people perform cognitive tasks. The cognitive revolution has had some influence on mental testing, although I have always maintained (Carroll, 1976) that mental testers were among the first cognitive psychologists. The influence has come in the form of making mental testers more aware of the cognitive nature of the tasks that comprise mental tests. One fruitful direction of research has been the examination of variations in the difficulties of cognitive tasks as a function of task characteristics. For example, Pellegrino and Kail's (1982) careful studies of spatial abilities have gone far to disclose what it is about spatial tasks that makes them vary in difficulty. As far as I am aware, similar research has not been done with foreign language aptitude tests, although some of them, like the Words in Sentences test (MLAT-IV), have used item difficulties as a basis for ordering items in the test.

Several possible outcomes of such research can be anticipated: (1) better understanding of the nature of the ability or abilities that are measured; (2) easier and more assured methods of developing items for such tests; and (3) closer focus on similarities and differences between the mental operations required in an aptitude test and those required in foreign language learning. On several occasions, I have tried to sketch such relations (Carroll, 1973) but un-

doubtedly much more could be done along these lines.

Thinking of mental tests as collections of tasks of varying difficulty yields a new perspective on the nature of an ability (Carroll, 1987a). That is, an ability describes a special relation between characteristics of individuals and the characteristics of the tasks they perform with varying degrees of success. If all the tasks are on a single scale of ability, as would normally occur for a well constructed ability test, for any individual one can visualize a curve of probabilities that decreases gradually (or sometimes steeply) as task difficulty increases. The curves for different individuals will differ, in the sense that they have different horizontal placements on the task difficulty scale, but they will all have the same general shape (i.e., declines with increasing task difficulty). It is interesting to speculate how this fact relates to observed differences among individuals in language learning success. Apparently the different levels of ability on aptitude tests correspond to increasing difficulties and longer times to learn whatever has to be learned in acquiring a foreign language. If this is so, further research in foreign language aptitude would require a more refined analysis of foreign language learning tasks in terms of the different cognitive abilities they call upon. I am not aware that much has been done in this direction, although the issue arises in connection with developing "pedagogical grammars" for foreign language learning.

One other thought occurs to me in this connection, namely, that many of the most successful tests or subtests of currently available foreign language tests are themselves learning tasks (i.e., "work samples" of foreign language learning). This is true, for example, of at least three of the subtests of the MLAT—Number Learning, Phonetic Script, and Paired Associates, and of several subtests in the PLAB. If novel foreign language aptitude tests are to be devised, one promising direction is to develop tests that would exemplify language learning tasks that are not covered in existing batteries (e.g., tasks requiring the learning of novel linguistic pragmatic rules, such as, the rules concerning forms of address that depend on social or family status). Absent the required task analyses of foreign language learning, I find myself at a loss in making specific suggestions.

Conclusion

While I remain somewhat skeptical about the possibilities for greatly improving foreign language aptitude predictions beyond their present levels, I have tried to offer suggestions concerning: (1) "fine tuning" of currently available tests and procedures; (2) expansion of test instruments in several domains of foreign language aptitudes by capitalizing on recent developments in the study of cognitive abilities; and (3) further study of the cognitive operations involved in foreign language learning, and attempts to develop tests and other procedures (e.g., work sample tasks) that would better capture the essences of these cognitive operations.

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2

Preliminary Investigation of the Relationship between VORD, MLAT and Language Proficiency

Thomas S. Parry & James R. Child

Introduction

This paper reports findings of a joint study conducted in 1987-88 by the Department of Defense (DOD) and the Central Intelligence Agency (CIA) to explore the psychometric properties of a new language aptitude test in an artificial language known as VORD. VORD means *word* in that language.

Our study was designed to determine the following: (1) Whether there are significant correlations between the VORD subtests and the Modern Language Aptitude Test[1] (MLAT) subtests; (2) whether there is a relationship between aptitude test performance and learner variables such as time-in-training, age, gender, level of motivation, and overall satisfaction with language training; and (3) whether VORD and MLAT either individually or together are significant predictors of oral and reading proficiency test outcomes.

In addressing these questions, we will describe VORD and MLAT, their advantages and disadvantages, and the philosophy behind the design of each test. Further, we will discuss the various forms VORD has assumed and the results obtained thus far from field test efforts that affected the design of the instrument and of this study.

VORD is based on a grammatical system similar to that of Turkish. It was developed by Child in the early 1970s to identify adult subjects with a talent for acquiring languages that are mark-

edly different syntactically from the high-density Western Indo-European languages that are more or less familiar to most language learners. Experience in the DOD with the *Army Language Aptitude Test* (ALAT) and earlier experience with the MLAT strongly indicated a need for the new instrument because both measures reflect the syntactic organization of Western European languages. Development of the new test began in 1973.

Foreign Language Aptitude and the MLAT

Before reviewing VORD's unique characteristics, we will discuss the nature of the construct *aptitude*, as exemplified in the best-known and most widely used aptitude test, the MLAT.

Carroll (1981) views foreign language aptitude in the following manner:

> corresponding to the notion that in approaching a particular learning task or program, the individual may be thought of as possessing some current state of capability of learning that task—if the individual is motivated, and has the opportunity of doing so. The capability of learning the task is thought to depend on some combination of more or less enduring cognitive characteristics of the individual. (p. 84)

The principal measure used to assess foreign language aptitude as defined above is the MLAT (Carroll & Sapon, 1959). This test is designed to measure several independent constructs that together, in a profile, constitute an individual's aptitude or ability to learn a foreign language as reflected in a composite score.

Research conducted by Carroll (1962, 1966) demonstrated that the MLAT accounted for a significant amount of the variance on foreign language achievement tests. This finding was confirmed by other researchers who found that aptitude test scores were reliable predictors of success by individuals (primarily adolescents and adults) in learning a second language through a traditional syllabus in a formal classroom environment. Gardner and Lambert (1972) found that aptitude test scores were reliable predictors of French course grades and accuracy of speech in French. Aptitude emerged

as a strong predictor of achievement in reading, vocabulary, and application of grammar rules as measured by the Cooperative French Test. Gardner and Lambert (1972) also found that the subtests of the MLAT were differentially sensitive to the various components of French proficiency. In general, these findings support Carroll's concept of language aptitude. Smythe, Stennett, and Feenstra (1972) also found that aptitude test scores were accurate predictors of student achievement, and could provide insights into student ability for placement purposes. This provides further corroboration of the importance of aptitude as a predictor of second language achievement. Interpreted together, these studies demonstrate that the degree of variability in second language achievement attributed to aptitude varies largely as a function of the type of achievement or criterion measure used.

The findings of several correlational and factor-analytic studies suggest that the construct of foreign language aptitude consists of several independent components (Carroll, 1958; Gardner, 1960; Gardner, 1965; and Smythe, Stennett, & Feenstra, 1972). These components are postulated to represent the skills requisite to the task of learning a foreign language (Carroll, 1971). They include phonetic coding ability, grammatical sensitivity, rote-learning and memory of foreign language materials, and inductive language-learning ability. These components (with the exception of inductive language-learning ability) are measured on the MLAT in varying degrees through five subtests. These are Number Learning, Phonetic Script, Spelling Clues, Words in Sentences, and Paired Associates.

Phonetic coding ability, as measured by MLAT subtest 2, Phonetic Script, is defined as "the ability to identify and store in long-term memory, new language sounds or strings of sounds" (Carroll, 1971, p. 4). The original protocol used to assess this ability, which led to the development of this MLAT subtest, was to present an individual with a string of two or three auditory nonsense syllables and then engage the individual in a distracting task for about ten seconds. The distracting task could involve doing mental arithmetic or any other cognitive activity not related to the initial learning task. After completing the distracting task, the person was asked to repeat the nonsense syllables. The person's ability to do so successfully in the

wake of a cognitively distracting task is related to that person's success in learning a foreign language. Carroll (1971) maintains that success in coping with such distractions apparently depends on success in remembering the identities of the sounds. Concerning the oral component of language learning, Carroll (1971) further maintains the following hypothesis about phonetic coding ability:

> [Phonetic coding ability] is necessary because the individual must not only learn the identities of the new phonemes of that language, but must also recognize and remember the phonetic sequences represented by the morphemes, words, and intonation contours of a given language. (p. 4)

Grammatical sensitivity is defined as "the individual's ability to demonstrate an awareness of the syntactic patterning of sentences in a language, and of the grammatical functions of individual elements in a sentence" (Carroll, 1971, p.5). This ability is measured by MLAT subtest 4, Words in Sentences. Scores on this subtest correlate highly with scores on more formal tests of knowledge of grammatical concepts and terminology (Carroll, 1981). These correlations occur "apparently because this ability is called upon when the student tries to learn grammatical rules and apply them in constructing or comprehending new sentences in that language" (Carroll, 1971, p.5).

Rote learning ability for foreign language materials is the ability of an individual to learn a large number of semantic-symbol and/or sound-symbol associations in a relatively short period of time. This ability is measured with a high degree of accuracy by MLAT subtest 5, Paired Associates. It is also measured to a lesser degree by MLAT subtest 1, Number Learning.

MLAT subtest 3, Spelling Clues, is a highly speeded measure of the sound-symbol association ability measured by subtest 2, Phonetic Script; but subtest 3, Spelling Clues, measures this ability to a lesser extent. Scores derived from this subtest depend in large measure on the subject's knowledge of English vocabulary (Carroll, 1959, p.3), (cf. Diller, 1981, p.106). Because subtest 3, Spelling Clues, measures both phonetic coding ability and vocabulary knowledge, it was regarded as an efficient way of measuring both of these aspects of foreign language aptitude simultaneously (Carroll, 1981,

p. 106). Carroll (1981) maintains that while English vocabulary knowledge is not a requisite in learning a foreign language, English vocabulary test scores are good indicators of ability to learn the more advanced lexical aspects of a foreign language.

Inductive language-learning ability is defined as "the ability to infer linguistic forms, rules, and patterns from new linguistic content itself with a minimum of supervision or guidance" (Carroll, 1966). Carroll (1971) maintains that it is through this factor that foreign language aptitude is hypothesized to be most closely related to the notion of general intelligence. The best method for measuring this ability is to present materials in an artificial language in such a way that individual learners call upon this ability in the learning of a foreign language; even if the teaching emphasizes the formal presentation of grammar rules, learners must still work out the application of the rules for language learning to take place. Although inductive language-learning ability emerges as an integral component of foreign language aptitude in the work of Carroll (1958), MLAT does not appear to measure this ability to any appreciable degree.

Unlike MLAT, VORD presents learners with an artificial language and requires them to learn the application of the rules of that language. VORD, however, was not the first artificial language aptitude test devised. Its development was, in part, an outgrowth of years of experience and research at DOD with the Army Language Aptitude Test.

The Army Language Aptitude Test

The ALAT was developed and validated in the late 1950s to predict learner success, particularly in learning to speak and read Western Indo-European languages.[2] It is a 57-item test based on an artificial language of Western Indo-European typology. The artificial language syntax, used on the ALAT, so closely resembles the syntax of English that a subject who is able to memorize a few grammar rules, vocabulary, and grammatical affixes can quickly achieve a relatively high score. The ALAT is not a memory test since subjects can refer to the rules and vocabulary lists as often as they like. It is highly speeded, however, because examinees are allowed

only seven minutes to study grammar and vocabulary, and 20 minutes to do the problems. Research in Western European languages at DOD shows that very high and very low STATENIZED[3] ALAT scores correlate with proficiency test results, while scores in the mid-STATEN range have little value as predictors. However, as a predictor of learner outcomes in such languages as Japanese, Korean, and Vietnamese, the ALAT has minimal predictive value (Horne, 1971). In sum, the major advantages of the ALAT are simplicity of administration and short testing time (27 minutes). Its major disadvantage stems from its highly speeded nature; few subjects are able to attempt its most challenging items, which come at the end.

Developing and Field Testing VORD

VORD, developed in 1973, was based on an artificial language structurally akin to Turkish. As noted earlier, Turkic languages are quite different in structure from the common Western European languages. It is unlikely that most prospective language students entering government language training will have studied Turkish or a related language in depth. Thus, it was felt that this typology would lend itself well to the design of an artificial language for a new aptitude test.

The original form of the test contained 32 items. The first ten items were designed to test nominal morphology; the second ten, verbal morphology; and the remaining twelve, phrase and sentence-level syntax. The items were designed to be progressively more difficult. The nominal morphology items called for simple suffixes to be added to nouns, and the verbal morphology items required subjects to select quite complex strings of correct verbal forms from multiple-choice listings. On the phrase and sentence-level syntax items, subjects supplied forms to establish sentence patterns rather than single phrases. The combined object of these tasks was to measure analytic skill (i.e., the ability to internalize and use grammar rules), rather than memory or other factors selected by Carroll for the MLAT. The test instructions and rules to be applied in responding to the items and pertinent vocabulary lists are available for reference at all times. Table 1 presents a comparison summary of

MLAT/VORD subtests and the language aptitude components hypothesized to be measured by each. Examples of VORD item types and formats are found in Appendix A.

Before field testing VORD, it was decided to give the test a trial run to gauge the time required to complete it and to obtain feedback as to whether this artificial language test would work with examinees. Using only ten DOD employees (some of whom had had training in linguistics), it was found that the time required for comfortable completion by skilled language learners was about 45 minutes, while average subjects required 60-70 minutes. Subjects' scores varied in proportion to the number of foreign languages they had studied. The combination of positive subject feedback and favorable test administration time suggested that the new test was worthy of full-scale field testing.

For field testing purposes, a comparison was made between VORD and ALAT relative to the strength and directionality of their relationship with a criterion measure of foreign language proficiency in each of three languages. Educational Testing Service (ETS) was contracted to arrange for subjects and to administer both VORD and ALAT during late 1973 and early 1974. Subjects were 300 college-level adult learners of German, Portuguese, and Russian (100 for each language) who had studied at least one other foreign language in high school or college. The criterion measure of foreign language proficiency was a CLOZE test in each of the three languages, to be administered at the end of language training. The German test consisted of 65 items, of which 19 required restoration of deleted affixes and 46 called for correct selection and inflection of content and function words from a list. The Portuguese test had 81 total items, of which 44 required restoration of deleted affixes and 37 the correct selection and inflection of content and function words from a list. The Russian CLOZE measure was composed of two passages with 57 total deletions, of which 37 called for restoration of affixes and function words; the remaining 20 had examinees select from a list of 20 content words and their inflection. The field test data were analyzed using product-moment correlation analysis and are summarized in Table 2.

The results of the field testing were encouraging even though the data were not analyzed according to a purely predictive validity

TABLE 1
Comparison Summary of MLAT/VORD Subtests and LanguageAptitude Components Hypothesized To Be Measured by Each

	Phonetic Coding Ability	Rote-Learning Ability	Memory	Sensitivity to Syntactic Organization	Inductive Language Learning Ability	Sound-Symbol Association
MLAT 1 Number Learning		X	X			
MLAT 2 Phonetic Script	X		X			
MLAT 3 Spelling Clues	X					X
MLAT 4 Words in Sentences				X		
MLAT 5 Paired Associates		X	X			
VORD 1 Noun Morphology			X	X		
VORD 2 Verb Morphology			X	X		
VORD 3 Sentence Syntax			X	X		
VORD 4 CLOZE				X	X	

TABLE 2

Product-Moment Correlations for VORD/ALAT Field Test Study I
(N = 100)

	ALAT	VORD
Portuguese CLOZE	.35	.52*
German CLOZE	.36	.35
Russian CLOZE	.33	.29

*p<.01 (All others p<.05)

approach. As can be seen from Table 2, the correlations between VORD and CLOZE test scores (r= .35, p<.05 German and r=.29, p<.05 Russian) were not significantly different from those of ALAT with CLOZE in the same languages (r=.36, p<.05 German and r=.33, p<.05 Russian). The Portuguese results revealed a stronger relationship between VORD and the CLOZE measure (r=.52, p<.01) than between ALAT and the CLOZE (r=.35, p<.05). Though of great interest, these findings must be interpreted with caution. In each of the three test comparisons it was noted that the relatively small number of questions on VORD (32), together with ample test time, led to a clustering of scores on the high end of the scale. Such a phenomenon means that the normal distribution assumption underlying the correlation analysis was not satisfied. Options considered to strengthen the test and to produce a more normal distribution of scores were the following: (a) Add another section of greater difficulty comparable to the ALAT final section, and (b) make VORD a speeded test. The latter option presented a problem, because by making VORD a speeded test, its capability to measure analytic ability would be reduced.

Before modifying the test, it was decided to conduct additional field testing using subjects studying languages other than the common Western European languages. Arabic, Chinese, and Japanese were selected. ETS arranged for 50 subjects in each language to participate. As in the first round, a CLOZE test in each of the languages was used as the criterion variable. The Arabic test consisted of a text with 34 deletions and a vocabulary list from which subjects selected not only appropriate vocabulary items but also the correct inflection for the context. The Chinese test was composed of two parts: a 25-item CLOZE test and an additional 50-sentence translation exercise designed to address major syntactic structures of the Chinese language. The Japanese test had 55 deletions in which subjects supplied function words only. Results of the product-moment correlation analyses are reported in Table 3.

As can be seen in Table 3, the correlations between VORD and the respective foreign language CLOZE tests were stronger overall than those between ALAT and the CLOZE tests. For Arabic, the relationship between VORD and CLOZE was considerably stronger than for languages studied in the first round (r=.53, p<.05), as was

TABLE 3

Product-Moment Correlations for VORD/ALAT Field Test Study II
(N = 50)

	ALAT	VORD
Arabic CLOZE	.48*	.53*
Chinese CLOZE	.07	.52*
Japanese CLOZE	.06	.22

*p<.05 (All others nonsignificant)

the relationship between ALAT and CLOZE (r=.48, p<.05). For Chinese, the VORD/CLOZE relationship was also gratifying (r=.52, p<.05), as compared with a totally random outcome for ALAT/CLOZE (r=.07, n.s.). Results for Japanese were less dramatic for VORD/CLOZE (r=.22, n.s.) and even less so for ALAT/CLOZE (r=.06, n.s.). Interpreted with caution, these findings provided some hope that the effort to develop a new language aptitude measure was on the right track. A concern, however, was that the raw-score range was too narrow to permit the establishment of STANINES/STATENS. Caused by too few items on the test, the same problem, to an extent, was encountered in DOD studies of the ALAT and its 57 items, of which the majority of candidates usually complete about 40. It was decided, therefore, that additional items would be developed to increase the length of VORD from 32 to 50 or 60 items.

At this point, work began on a CLOZE section (similar to the CLOZE sections used in the DOD language proficiency tests mentioned above) that incorporated VORD language text, formatted on a right-hand page, and English translations on each facing left-hand page. Twenty-eight deletions were made from the text and, in the interest of maintaining a machine-scorable test, were embedded in a multiple-choice format with five alternatives listed below each lined blank.

Once again, only subjects within DOD were chosen for feasibility testing. A total of 19 participated. The objective of the feasibility testing was to derive scores whose distribution could be examined for normality. Four of the subjects were individuals with formal training in linguistic science; three subjects had specialization in Turkic languages. Another group (12) had specialized in Romance languages. The not-too-surprising result was that the subjects with training in linguistics and Turkic languages scored high. The desired outcome was achieved, however, with the Romance languages group, whose results were found to be normally distributed. Item analysis revealed three items that consistently did not function. They were eliminated, resulting in a 57-item test.

Since 1977, VORD has been informally administered to applicants for DOD language jobs. Their VORD scores have been compared with their scores on language proficiency tests. Though lacking scientific rigor, these informal studies reveal the same gen-

eral relationships between ALAT/VORD and the Russian CLOZE tests as obtained in the ETS study. In languages other than Russian, the data are too scant to permit firm conclusions.

The Present Study

Late in 1986, almost ten years later, members of the Interagency Language Roundtable (ILR) Testing Committee began questioning the validity and utility of the MLAT as a screening device for applicants to language training in government language schools. Discussions took place when a decision to discontinue using MLAT for screening purposes seemed imminent at several government agencies. At the time, committee members argued that the MLAT was the most widely researched language aptitude assessment instrument in the U.S. and that further research comparing the MLAT with other known aptitude assessment instruments in use would lead to a more enlightened decision on MLAT's continued use. The Testing Committee's position was forwarded and the decision to halt use of the MLAT was stayed.

For the first time in ten years, the Federal Government conducted a research study on language aptitude testing. Because further information on the psychometric properties of the VORD was needed and the body of research on the MLAT was extensive, it was felt that the two measures should be compared to discover possible intercorrelations among subtests and to determine the validity of each for predicting end-of-training language proficiency outcomes. A joint exploratory study at CIA and DOD was designed and conducted in the spring of 1987.

The study was carried out in two phases. In phase one, the following research question was posed: Do significant correlations exist between MLAT and VORD subtests? In addition, two related questions were posed: Is there a significant correlation between performance on MLAT/VORD and learners' perceived aptitude to learn foreign languages? Is there a relationship between aptitude test performance and such learner variables as time-in-training, age, gender, level of motivation, and overall satisfaction with language training?

The data were collected between January and February 1987 and

preliminary findings were first reported at the spring 1987 government pre-session of the Georgetown University Roundtable on Languages and Linguistics.

For phase two of the study in the summer of 1987, the following questions were posed: Do significant correlations exist between learner performance on MLAT/VORD and performance on end-of-training oral and reading proficiency tests? Which subtests of the MLAT and VORD, individually or in combination, are the strongest predictors of oral and reading proficiency test outcomes as defined by the ILR Skill Level Descriptions for reading and speaking?

Design and Procedures

Thirty-six subjects (17 male and 19 female) enrolled in government intensive-language-training programs volunteered to participate in the study. The subjects ranged in age from 21 to 56 years; all were native speakers of English. Many had completed long tours of duty overseas and were learning their second or third foreign language. Languages previously studied by subjects included Arabic, Chinese, French, Demotic Greek, Japanese, Polish, Russian, Spanish, Swedish, and Turkish. Each subject completed the VORD in January 1987 with a proctored 90-minute time limit. The MLAT was administered at the beginning of training approximately four months prior to the VORD, and scores were taken from subject test records. (It should be noted that subjects were not pre-selected for language training based on MLAT scores or any other criteria.) Before ending their language training, subjects completed an in-house questionnaire (see Appendix B) designed to gather demographic information, such as time-in-training and age, and to provide data on subjects' perception of their aptitude, level of motivation, preferred learning techniques, and overall satisfaction with the language training program. At the end of their training, subjects completed the oral proficiency interview (OPI)[4] and reading proficiency tests[5]. Data were collated and analyzed using the Correlation and Stepwise Multiple Linear Regression programs of the Statistical Analysis System (SAS). All of the variables studied are listed in Appendix C.

Data Analysis and Discussion for Phase One

In Phase One of the study, the primary objective was to discover whether significant intercorrelations between MLAT and VORD subtests could be detected.

The first three subtests of VORD, Nominal Morphology, Verbal Morphology, and Phrase and Sentence-Level Syntax, are formal grammar exercises of a traditional type that test language forms (e.g., cases for nouns, tense for verbs) as they mark grammatical functions (e.g., the role of nouns and the valency of verbs in sentences). These VORD subtests appear to relate most closely to MLAT subtest 4, Words in Sentences. However, unlike MLAT subtest 4, which is entirely in English, VORD requires the application of rules reflecting a Turkic rather than a Western Indo-European structure, which is a much more challenging task. We hypothesized, therefore, that a fair correlation (in the range of .60) would emerge between MLAT subtest 4 and any one or a combination of VORD subtests 1 through 3. We further hypothesized that other subtests of the MLAT would have little or no relationship to VORD subtests; theoretically, if the two aptitude tests measure different components of foreign language aptitude, intercorrelations between MLAT/VORD subtests should prove less significant.

Data analysis (Table 4) revealed that MLAT subtest 4, Words in Sentences, did correlate significantly in the range hypothesized above with VORD's subtest, Phrase and Sentence-Level Syntax ($r=.632$, $p<.001$). A significant, although slightly smaller, correlation was also detected between MLAT subtest 4 and the Verbal Morphology subtest of VORD ($r=.532$, $p<.01$). However, MLAT subtest 4 did not significantly correlate with the Nominal Morphology subtest. The reason that the correlations appear to diminish for each of the VORD subtests when correlated with MLAT subtest 4 may be due in part to the nature of VORD's two morphology subtests. For example, VORD's Verbal Morphology subtest involves complex embedding processes in various items as compared with the Nominal Morphology exercise that merely reflects certain Western Indo-European inflectional paradigms.

Contrary to expectation, 24 out of 30 possible first-order intercorrelations between subtests and composite scores from the two aptitude measures achieved statistical significance at the .05 level.

TABLE 4

Intercorrelation Matrix for MLAT/VORD
Subtest and Composite Scores
(N = 36)

	MLAT1	MLAT2	MLAT3	MLAT4	MLAT5	MLATCOMP
VRDNOUN	.344*	.405	.463	.329*	.069*	.433
VRDVERB	.575	.417	.504	.532	.603	.661
VRDSENT	.421	.638	.655	.632	.351*	.689
VRDTEXT	.258*	.495	.317*	.473	.425	.462
VRDCOMP	.471	.637	.576	.632	.488	.696

* not significant

The analysis (reported in Table 4) revealed that there is a significant moderate correlation between composite scores on the MLAT and VORD (r=.696, p<.01). Of particular interest was the range of correlations observed between MLAT and VORD subtests (r=.2 to .68). The VORD Phrase and Sentence-Level Syntax (VRDSENT) subtest was found to be significantly correlated with MLAT composite scores (r=.689, p<.001) and three of the MLAT subtests: MLAT-2, Phonetic Script (r=.638, p<.001); MLAT-3, Spelling Clues (r=.655, p<.001); and MLAT-4,Words in Sentences (r=.632, p<.001). With the exception of the correlation with MLAT subtest 4, the other correlations with Phrase and Sentence-Level Syntax were unexpected and it is not clear why they occurred. The VORD Verbal Morphology (VRDVERB) subtest correlated most strongly with MLAT-5, Paired Associates (r=.603, p<.001 respectively) as did VRDVERB and VRDSENT with MLAT composite scores (r=.661, p<.001) and r=.689, p<.001 respectively). This was probably due to the combined effects of the subtests when related to the composite scores.

Although the practical significance of many of the correlations is questionable (owing to the small size of the sample), the general trend reported in Table 4 may be indicative of a potentially complex underlying factor structure. Replication of the study with a larger sample, and employing exploratory factor-analysis, would be needed to clarify the factor structure of the subtests.

Analysis of the in-house questionnaire (Appendix B) yielded only one noteworthy finding. Item 6 focused on how subjects perceived their own ability to learn foreign languages. Analysis revealed that subjects viewed themselves as average to slightly above-average language learners on a scale from poor to superior. Actually, these subjects tended to score in the average range on the MLAT according to government norms. The correlation between subjects' perceived aptitude (SPA) for learning foreign languages and performance on the MLAT was found to be significant and relatively strong (r=.727, p<.001). On the VORD, subjects scored in the 43rd percentile (no norms). The correlation between perceived aptitude and VORD was mild but significant (r=.450, p<.05). These findings were expected, considering the differences between MLAT and VORD tasks and the unfamiliarity of most subjects with Turkic languages.

No significant correlations were found between the variables of age, level of motivation, overall satisfaction with language training, and MLAT/VORD subtest and composite scores. The time-in-training variable failed to correlate with any of the VORD subtests, but was found to be significantly correlated with MLAT composite scores ($r=.591$, $p<.05$) and MLAT subtest 3 ($r=.621$, $p<.01$).

Data Analysis and Discussion for Phase Two

The two research questions posed for the second phase of the study were the following: (1) Do significant correlations exist between learner performance on MLAT/VORD and on end-of-training AEI[4] oral and reading proficiency tests?, and (2) which subtests of the MLAT and VORD, either individually or in combination, are the strongest predictors of oral and reading proficiency test outcomes? These are important questions because most published language aptitude research (i.e., Carroll, 1958, 1959, 1962, 1966; and Horne, 1971) has examined language aptitude tests using discrete-point achievement tests or end-of-course grades as criterion variables. Other than research by the Department of Defense, the Defense Language Institute, and the Foreign Service Institute using CLOZE tests as the criterion, little is known about the capability of present-day language aptitude tests to predict end-of-training oral and reading language-proficiency outcomes as defined by the ILR Skill-Level Descriptions.

Analysis revealed significant mild correlations between MLAT composite scores and speaking proficiency ($r=.476$, $p<.01$) and between MLAT composite scores and reading proficiency ($r=.447$, $p<.01$). Significant mild to low correlations were also found for VORD composite scores with speaking proficiency ($r=.463$, $p<.01$) and with reading proficiency ($r=.345$, $p<.05$). These findings are presented in Table 5.

We knew that some correlations between the aptitude test composite and subtest scores and language proficiency outcomes would emerge. To what degree we did not know, because research examining the relationship between language aptitude and language proficiency outcomes was so scant that a theoretically-based hypothesis was out of the question. Although statistically significant, the correlations reported in Table 5 are particularly informative

TABLE 5

Intercorrelation Matrix of MLAT/VORD Subtest and Composite Scores by Speaking and Reading Language Proficiency Scores
(N = 36)

	Reading	Speaking
MLAT-1	.245	.223
MLAT-2	.497*	.467*
MLAT-3	.423**	.475*
MLAT-4	.410**	.382**
MLAT-5	.241	.368
MLATCOMP	.447*	.476*
VRDNOUN	.297	.294
VRDVERB	.188	.384**
VRDSENT	.456*	.493*
VRDTEXT	.223	.336
VRDCOMP	.345	.463*

* $p<.01$
** $p<.05$

from a practical point of view, because linear regression analysis with such a small sample size is likely to be inconclusive.

The next step was to determine which, if any, of the aptitude test composite and subtest scores were the strongest predictors of proficiency in speaking and reading. To do this, stepwise multiple linear regression analysis was used. The analysis first examined the predictive properties of the MLAT/VORD subtests, then those of the MLAT/VORD composite scores alone, and finally the predictive properties of the VORD subtests alone. Results of the analysis are reported in Table 6.

Combining VORD/MLAT subtests in the regression model, MLAT subtest 2, Phonetic Script, was found to be the strongest predictor of reading proficiency. Note, however, that while the F-tests indicate that the prediction achieved significance, the *R-squared* statistic (the proportion of variance in the dependent variable explained by the independent variable) is negligible. MLAT subtest 3, Spelling Clues, was the strongest predictor of proficiency in speaking. Exactly what these findings tell us is uncertain because proficiency data are scant. However, Carroll (1981) reports that MLAT subtest 3, Spelling Clues, is often cited as being a strong predictor because it relies in part on verbal intelligence and vocabulary knowledge, both of which play important roles in higher levels of language learning. Of the four VORD subtests, the Sentences subtest proved to be the strongest predictor of both reading and speaking proficiency. MLAT composite scores were significantly better overall predictors of both speaking and reading language proficiency than VORD composite scores. These latter findings were expected considering that the MLAT was designed to predict success in learning Western Indo-European languages and that most of the subjects in the sample were so engaged. A larger sample of subjects studying other than Western Indo-European languages would be required to further validate the predictive capabilities of the VORD.

TABLE 6

Stepwise Multiple Linear Regression. Foreign Language Proficiency Variables Regressed on Aptitude Test Composite and Subtest Scores [1]

Criterion	Step	Aptitude Variable Entered	STD Error	F	Prob
Speaking	1	MLATCOMP	.004	8.205	.01*
Reading	1	MLATCOMP	.005	6.488	.01

TABLE 6 (continued)

Speaking	1	MLAT-3	.011	8.148	.01**
Reading	1	MLAT-2	.042	8.532	.01
Speaking	1	VORDSENT	.053	10.937	.01***
Reading	1	VORDSENT	.067	8.141	.01

1 Entry Level set at alpha .05
* Only MLAT and VORD composite scores used
** MLAT and VORD subtest scores used
*** VORD subtest scores only

Summary and Conclusion

In this paper, we have looked at a new and different language aptitude test known as VORD. We have examined forerunners of VORD and how they affected its design. Moreover, we have described VORD's purpose, history, philosophy, design, and the results of our field test studies. We have also looked at the design of MLAT and results of years of research on that instrument. We have examined the nature and extent of intercorrelations between VORD, MLAT, numerous other language-learning variables, and foreign language proficiency. Finally, we have examined VORD's predictive validity for certain languages.

The primary finding of this research, based on the population studied, is that the MLAT appears to be the best overall instrument for predicting language-learning success. What is less clear is whether or not the two instruments functioned differently in non-Indo-European language prediction. However, we must emphasize that the findings reported herein are very tentative, owing to the very small sample size.

In concluding, we would like to suggest some thoughts and directions for further research that have evolved from this and related studies presented at this symposium. First, a replication of this study is needed, using a representative student population with a large enough sample size to examine thoroughly the factor structure of the MLAT and VORD together. Second, a population with a large enough sample of subjects studying non-Indo-European languages would be needed for a definitive study on predictive differentiation of the two instruments on the basis of language typologies. Once these goals are accomplished, and depending on the outcomes of the research, a subject worth exploring is the difference between *language* and *linguistic* aptitudes (assuming that such a difference can be demonstrated). Most measures claiming to test *language* aptitude appear to address analytic skills required for establishing formal paradigms at word, phrase, and sentence levels (in other words *linguistic* skills). The first three subtests of VORD, Nominal Morphology, Verbal Morphology, and Phrase and Sentence-Level Syntax, and subtests 3 and 4 of MLAT, Spelling Clues and Words in Sentences, are prime examples of this approach. On the other hand,

subtest 4 of VORD, the CLOZE-like model, is a step toward testing language aptitude in a contextual framework, because general rules must be applied to particular segments of text. A measure capable of eliciting a subject's skill in applying such rules to text could prove most beneficial. Further research on VORD as described above, including revisions (where necessary) and analysis of future wide-scale trials (if these can be arranged) would be just one approach—and an interesting one—to a complex problem.

Notes

1) The MLAT was chosen for analysis in this study because of its extensive use throughout the Federal Government. Aptitude tests such as the Pimsleur Language Aptitude Battery (PLAB) and the Defense Language Aptitude Battery (DLAB) were not examined since the federal agencies that participated in the study do not use them. Furthermore, PLAB was validated primarily for adolescents and is not, to our knowledge, used as a screening device for government language training. DLAB requires a significantly longer administration time than either VORD or MLAT. This is not to say that future research should not address these tests.
2) A complete history of the development of the ALAT and some of the early validation research carried out is reported in a paper by Kibbey Horne, *Differential Prediction of Foreign Language Testing*, presented to the London Bureau of International Coordination in 1971.
3) In order to simplify the interpretation and use of raw test scores, DOD has adopted a system of *STATEN* scoring. The STATEN (pronounced stay-ten) comes from *standard ten*, the term meaning a standard method of grouping scores into ten categories. The lowest category is a 0, while the highest is a 9. The STATEN distribution curve is theoretically a normal curve. There are five STATENS, 0 through 4, below the mean or average STATEN of 4.5, and five STATENS, 5 through 9, above it.
4) The Oral Proficiency Interview (OPI) is a language-general (it can be used with any language), integrative, criterion-referenced

test that evaluates a candidate's foreign language speaking ability when talking to a trained tester for a period of 10 to 40 minutes. The resulting speech sample is then rated on a scale of 0, for no practical ability to function in the language, to 5, for ability equivalent to that of a well-educated native speaker. A plus may be given for levels 0,1,2,3, and 4, to indicate ability that substantially surpasses the requirements for a given level but that is not sustained at the next higher level.

The OPI addresses a number of oral skills simultaneously, looking at them from a global perspective, rather than from the point of view of the absence or presence, control or semi-control, of any given linguistic point. Linguistic points are not ignored, but regarded from a wider perspective of function.

5) Reading proficiency tests are developed and validated in-house and are multiple-choice in format. They employ a variety of item types to assess a candidate's reading proficiency on a scale of 0, for no practical ability to read in the language, to 5, for ability equivalent to that of a well-educated native reader. Plusses are given to indicate ability that substantially surpasses the requirements for a given level but that is not sustained at the next higher level. The multiple choice item types used are the following: (1) questions about grammar, vocabulary, and idiom; (2) restatements in English; (3) restatements in the target language; and(4) questions about reading passages.
6) AEI is a combined acronym for three organizations that have participated in the development of language proficiency guidelines and skill-level descriptions in the four language skills. They are ACTFL (American Council on the Teaching of Foreign Languages, ETS (Educational Testing Service), and ILR (Interagency Language Roundtable).

APPENDIX A

Examples of VORD Subtests

VORD SUBTEST I: NOMINAL MORPHOLOGY
...to the plan...

a.	**kolbon**	*(Plural Objective)*
b.	***kolbora***	***(Singular Benefactive)*****
c.	**kolbordon**	*(Singular Ablative)*
d.	**kolb**	*(Singular Objective)*
e.	**kolbom**	*(Singular Instrumental)*

VORD SUBTEST II: VERBAL MORPHOLOGY
It was not completed...

a.	**dravazunadi**	*(Past Passive Negative Nominalizer)*
b.	**dravunadi**	*(Past Active Negative Nominalizer)*
c.	**dravazunaki**	*(Future Passive Negative Nominalizer)*
d.	***dravazunad***	***(Past Passive Negative Finite)*****
e.	**dravunad**	*(Past Active Negative Finite)*

VORD SUBTEST III: PHRASE AND SENTENCE-LEVEL SYNTAX

Dravazunaki kolb...

a.	***The plan which will not be completed*****
b.	**The plan is not to be completed...**
c.	**The plan is not to be completed...**
d.	**The incomplete plan...**
e.	**The plan will not be completed...**

VORD SUBTEST IV: TEXT COMPLETION

The plan that has been completed will be put into effect this week. It meets the need for new equipment.	Dravazadi kolb ek _____ flanazak. a. vostom b. vost c. *vostor*** d. vostora e. vostordon
	Kez mont yonk _____ kravazar... a. *inom*** b. inor c. in d. inora e. inordon

(The double asterisk marks the correct answer)

APPENDIX B

Language Learning Questionnaire

Questionnaire # _____

This questionnaire has been designed to help us know more about how we can meet individual learning styles in our language training program. Please give us accurate and complete responses. All responses will be kept strictly confidential and will not become a part of your official file. Please do not include your name on this questionnaire.

Part I- General Information

Please fill in the information requested with complete and accurate information. Do not write in the far right-hand column of numbered spaces.

1. Your age:_____ (1) _____

2. Sex:_____ (2) _____

3. Language currently being studied: (3) _____

4. Previous languages studied: (4) _____

4a. Language 1_____ Time in training: _____ (4a) _____

4b. Language 2 _____Time in training: _____ (4b) _____

4c. Language 3_____ Time in training: _____ (4c) _____

5. Foreign residency: (5) _____

5a. Area 1 _____ Time in residence: _____(5a) _____

5b. Area 2 _____ Time in residence: _____(5b) _____

5c. Area 3 _____ Time in residence: _____(5c) _____

Part II

Respond to each of the following questions by circling the one option that best characterizes your feelings in relation to the question. Do not write in numbered spaces.

6. How do you perceive your own ability to learn foreign languages?

a. Poor
b. Below Average
c. Average
d. Above Average
e. Outstanding (6) _____

7. How motivated are you to learn the language you are currently studying?

a. Not at all motivated
b. Somewhat motivated
c. Sufficiently motivated
d. Very motivated
e. Highly motivated (7) _____

8. Considering your own course objectives and the amount of training completed, how satisfied are you with your progress in speaking the language?

a. Not at all satisfied

b. Somewhat satisfied
c. Sufficiently satisfied
d. Very satisfied
e. Highly satisfied (8) _____

9. Considering your own course objectives and the amount of training completed, how satisfied are you with your progress in reading the language?

a. Not at all satisfied
b. Somewhat satisfied
c. Sufficiently satisfied
d. Very satisfied
e. Highly satisfied (9) _____

10. Considering your own course objectives and the amount of training completed, how satisfied are you with your progress in understanding the spoken language?

a. Not at all satisfied
b. Somewhat satisfied
c. Sufficiently satisfied
d. Very satisfied
e. Highly satisfied (10) _____

11. How satisfied are you overall with the language instruction you have received to date?

a. Not at all satisfied
b. Somewhat satisfied
c. Sufficiently satisfied
d. Very satisfied
e. Highly satisfied (11) _____

12. Even though a variety of techniques may be used in the classroom to help you learn to speak the language, which of the following seems to be used most by your instructor?

    a. Having you memorize dialogues and grammar forms
    b. Having you drill and practice grammatical structures
    c. Having you ask and answer questions
    d. Having you participate in role plays

(12) _____

13. With which one of the following do you feel most comfortable in learning to speak the language?

    a. Memorizing dialogues and grammar forms
    b. Drilling and practicing grammatical structures
    c. Asking and answering questions
    d. Participating in role plays
    e. Conversing freely on a wide range of topics

(13) _____

14. Even though a variety of techniques may be used in the classroom to help you learn to read the language, which of the following seems to be used most by your instructor?

    a. Having you translate text word-for-word
    b. Having you look at text to identify recurring topics
    c. Having you find the main ideas and some of the supporting facts
    d. Having you read text rapidly to get the main idea of the topic in outline form
    e. Having you read to get the whole picture and the ways in which the details relate to that picture

(14) _____

15. With which one of the following do you feel most comfortable in learning to read the language?

a. Translating text word-for-word
b. Looking at text to identify recurring topics
c. Finding main ideas and some of the supporting facts
d. Reading text rapidly to get the main idea of the topic in outline form
e. Reading to get the whole picture and the ways in which the details relate to that picture

(15) _____

APPENDIX C

Aptitude Research Study
List of Acronyms and Variable Names

ID	Subject Identification Number
MLAT1	Modern Language Aptitude Test - Subtest 1 (Number Learning)
MLAT2	Modern Language Aptitude Test - Subtest 2 (Phonetic Script)
MLAT3	Modern Language Aptitude Test - Subtest 3 (Spelling Clues)
MLAT4	Modern Language Aptitude Test - Subtest 4 (Words in Sentences)
MLAT5	Modern Language Aptitude Test - Subtest 5 (Paired Associates)
MLATCOMP	Modern Language Aptitude Test - Composite Score
VRDNOUN	VORD Language Test - Section 1 (Nouns)
VRDVERB	VORD Language Test - Section 2 (Verbs)
VRDSENT	VORD Language Test - Section 3 (Phrases and Sentences)
VRDTEXT	VORD Language Test - Section 4 (Text)

VRDCOMP	VORD Language Test - Composite Score
AGE	Subject Chronological Age
SEX	Subject Sex
LANGCAT	Language Category by Level of Difficulty (Category I, II, or III)
LANGSTDY	Number of Languages Studied Previously
TIMETRNG	Total Time Dedicated to Training in Languages Previously Studied
TIMERES	Total Time in Foreign Residence (in Years)
SPA	Subject's Own Perceived Aptitude to Learn Foreign Languages
MOT	Subject's Level of Motivation to Learn the Foreign Language
SATSPKG	Subject's Level of Satisfaction in Learning to Speak the Language
SATRDG	Subject's Level of Satisfaction in Learning to Read the Language
SATUND	Subject's Level of Satisfaction in Learning to Understand the Language
TCHSPKG	Method Most Commonly Used in the Classroom to Teach Speaking

LRNSPKG	Method Preferred by Subject to Learn Speaking Skills
TCHRDG	Method Most Commonly Used in the Classroom to Teach Reading
LRNRDG	Method Preferred by Subject to Learn Reading Skills
READING	End-of-Training Reading Proficiency Test Score
SPEAKING	End-of-Training Speaking Proficiency Test Score

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3

Styles, Strategies, and Aptitude: Connections for Language Learning

Rebecca L. Oxford

Introduction

The topic of language learning styles and strategies has recently come into vogue among researchers and practitioners. All around the world, language conferences include discussions about styles and strategies. New books (Wenden & Rubin, 1987; Willing, 1988; Oxford, 1990) offer information on styles or strategies, though not usually on both topics in the same volume. The language aptitude symposium on which this volume was based was unusually up-to-date in its presentation of styles and strategies. The symposium treated learning styles and strategies as possible components, or at least as potential correlates, of language learning aptitude, and therefore, as predictors of language proficiency.

Few empirical studies or synthesis papers have attempted to link styles and strategies, much less to associate these two concepts with aptitude. This chapter seeks to summarize research results currently available on these topics and to explore their possible interconnections. Specific implications for language aptitude testing are presented.

Existing research on styles and strategies as explained in this chapter might seem to the reader to be more like a fragmentary, unfinished mosaic—with some pieces overlapping and others missing—than like a neat, well-planned, systematic, hierarchical structure. The mosaic-like descriptions found here should not be a cause

for alarm to readers, because these descriptions truthfully reflect the current status of style and strategy research.

Definitions

Learning style, the learner's preferred mode of dealing with new information, includes a construct known as cognitive style. Learners' actions to enhance their own learning are known as learning strategies. Learning strategies usually reflect the learners' typical learning style—but not always, as will be discussed later. All of these elements have been shown, in one way or another, to be predictive of success in language learning. The relationship of these elements to the idea of aptitude is not yet clear in either theory or practice. For the time being, the question of whether styles and strategies are part of, or simply related to, language learning aptitude will be left open. That question will be discussed in the sections on implications for testing and implications for further research. Let us further define each of the key terms.

Language learning aptitude, a seemingly simple term, is actually a very complicated concept. Traditional dictionary definitions say that aptitude is a natural tendency or inclination; an ability, capacity, or talent; a quickness to learn or understand. Difficulties arise, however, in trying to operationally define or measure aptitude, particularly in the language learning area. A commonly accepted but tautological definition is that language learning aptitude is a student's score on a language aptitude measure, like the Modern Language Aptitude Test (MLAT) (e.g., Parry, 1984, p. 4). That definition by itself is not very informative, particularly because many language aptitude tests focus on analytical and analogical skills and not on the student's potential for the development of more global skills also needed for communication. It is possible to add that language learning aptitude is "the ability to learn and understand a foreign language" as a function of the amount of time required to learn it, the desire of the individual to learn, and perseverance in the learning task (Parry, 1984). However, these additions still fail to clarify what it means "to learn and understand a foreign language," the goal toward which one's aptitude or ability is directed.

There is a great need to devise an operational definition of

language learning aptitude. We might define language learning aptitude as the ability to develop four aspects of communicative competence: grammatical, sociolinguistic, discourse, and strategic competence (Canale, 1983; Canale & Swain, 1980). Each of these components is also defined by Canale and Swain: (a) *Grammatical competence* is the degree to which the language user has mastered the linguistic code; (b) *sociolinguistic competence* is the extent to which grammatical forms can be used appropriately in various social contexts to convey specific communicative functions and to reflect style, register, etc.; (c) *discourse competence* is the ability to combine ideas to achieve cohesion in form and coherence in thought; and (d) *strategic competence* is the ability to use certain strategies to compensate for gaps in the language user's knowledge of the target language.[1] This particular framework, though useful, is only one of many that concern competence or proficiency in using a new language. John Carroll, for instance, put forth a different four-factor theory (Carroll, 1981). For purposes of discussion, we will assert that no theory of aptitude, nor any actual measure of aptitude, should be considered adequate unless it somehow predicts communicative competence in a broad sense.[2]

Lawrence (1984) indicates that the term *learning style* is used loosely in educational research to encompass four learner traits: (a) cognitive style, i.e., preferred or habitual patterns of mental functioning; (b) patterns of attitudes or interests that influence a person's attention in a learning situation; (c) a disposition to seek learning environments compatible with one's cognitive style, attitudes, and interests, and to avoid incompatible learning environments; and (d) a disposition to use certain learning tools (learning strategies) and avoid others. This comprehensive definition of learning style thus spills over into the affective domain and helps predict strategy choice.

Willing (1988) defines learning style as an inherent, pervasive set of characteristics related to how learners prefer to learn or to deal with new information. Learning style contains many different cognitive, social, and affective elements. Examples of these elements are analytical-global processing (cognitive), competition-cooperation (social), and risk-taking (affective). Although learning style is usually assumed to be relatively stable and consistently applicable to a

variety of learning tasks, this might not always be the case. Learning style can be influenced by the situation, by the person's developmental level, or by certain kinds of style training.

As indicated above, *cognitive style* is a construct subordinate to learning style. Cognitive style concerns preferences for certain modes of information processing or functioning, or the person's usual way of perceiving, thinking, or remembering (Kogan, 1971). Thus, cognitive style theoretically skirts the issues of interests, attitudes, and motivations—the affective elements that are necessarily influential in the broader construct of learning style (Willing, 1988). However, in research and practice, cognitive style is hardly distinguishable from learning style. The two terms are often used synonymously. This is unfortunate, because learning styles contain far more than just cognitive elements.

Learning style includes a large number of largely unintegrated dimensions, studied in a one-by-one fashion by most researchers. Shipman and Shipman (1985) list 19 style dimensions, based on work by Messick (1972, 1976) and Kogan (1971): field independence-dependence, field articulation, conceptualizing styles, breadth of categorization, conceptual differentiation, compartmentalization, conceptual articulation, conceptual integration, cognitive complexity-simplicity, leveling-sharpening, scanning, reflection-impulsivity, risktaking-cautiousness, tolerance for unrealistic experience, constricted-flexible control, strong-weak automatization, conceptual-perceptual-motor dominance, sensory modality preference, and convergent-divergent thinking. In addition to these, different researchers have included as aspects of style the following dimensions, among many others: tolerance for ambiguity, brain hemisphericity, willingness to imitate models, extraversion-introversion, sensing-intuition, and need for closure. Most styles are broad, but some seem to be specific responses to particular situations or stimuli. Some styles overlap, while others do not.

Learning strategies are steps or actions taken by language learners to enhance any aspect of their learning: accession, storage, retrieval, and use of information (Rigney, 1978; Oxford, 1990). Dozens or even hundreds of learning strategies exist, depending on how narrowly these strategies are operationally defined or measured.

Language learning strategies can be classified, explained, and exemplified in six coherent groups (Oxford, 1990). Although this classification system is still being refined, it is probably the most comprehensive, practical, and theoretically grounded one so far available. The six strategy groups are labeled memory, cognitive, compensation, metacognitive, affective, and social. The first three groups are known as "direct" strategies, because they directly involve the subject matter, in this case, the target language to be learned; the last three groups are called "indirect" strategies, because they do not directly involve the subject matter itself, but are essential to language learning nonetheless.

Memory strategies aid in entering information into long-term memory and retrieving information when needed for communication. *Cognitive* strategies are used for forming and revising internal mental models and receiving and producing messages in the target language. *Compensation* strategies, such as guessing unknown meanings while listening or reading, or using circumlocution in speaking and writing, are needed to overcome any gaps in knowledge of the language. *Metacognitive* strategies help learners exercise "executive control" through planning, arranging, focusing, and evaluating their own learning process. *Affective* strategies enable learners to control feelings, motivations, and attitudes related to language learning. *Social* strategies facilitate interaction with others, often in a discourse situation. As yet, there is no consensus among researchers about categories of strategies, nor about how to measure them. However, these six categories will serve the purpose at this time. TABLES I and II provide a detailed list of language learning strategies as an example of the possible range.

Just as cognitive style is a subconstruct of learning style, cognitive strategies are a subconstruct of learning strategies. Fortunately, strategy researchers have focused on cognitive strategies, and have also examined other kinds of learning strategies, such as, certain types of memory, metacognitive, and compensation strategies. However, the majority of investigators have ignored most of the affective strategies and have looked at social strategies in a limited way, even though affective and social variables are among the most powerful predictors of language learning outcomes (see Gardner, 1985, for a review of social-psychological issues in language learn-

TABLE I
DIRECT STRATEGIES

Memory Strategies	Creating mental linkages	1. Grouping 2. Associating/elaborating 3. Placing new words into a context
	Applying images and sounds	1. Using imagery 2. Semantic mapping 3. Using key words 4. Representing sounds in memory
	Reviewing well	1. Structured reviewing
	Employing action	1. Using physical response 2. Using mechanical tricks or sensation
Cognitive Strategies	Practicing	1. Repeating 2. Formally practicing with sounds and alphabets 3. Recognizing and using formulas and patterns 4. Recombining 5. Practicing naturalistically
	Receiving and sending messages	1. Getting the idea quickly 2. Using resources for receiving and sending messages
	Analyzing and reasoning	1. Reasoning deductively 2. Analyzing expressions 3. Analyzing contrastively 4. Translating 5. Transferring
	Creating structure for input and output	1. Taking notes 2. Summarizing 3. Highlighting

TABLE I
DIRECT STRATEGIES (continued)

	Guessing intelligently	1. Using linguistic clues 2. Using other clues
Compensation Strategies	Overcoming limitations in speaking and writing	1. Switching to the mother tongue 2. Getting help 3. Using mime or gesture 4. Avoiding communication partially or totally 5. Selecting the topic 6. Adjusting or approximating the message 7. Coining words 8. Using a circumlocution or synonym

Note: From R. L. Oxford (1990). *Language learning strategies: What every teacher should know.* New York: Newbury House/Harper & Row.

TABLE II
INDIRECT STRATEGIES

Metacognitive Strategies	Centering your learning	1. Overviewing/linking with already known material 2. Paying attention 3. Delaying speech production to focus on listening
	Arranging and planning your learning	1. Finding out about language learning needs 2. Organizing 3. Setting goals and objectives 4. Identifying the purpose of a language task (purposeful listening/reading/speaking/writing) 5. Planning for a language task 6. Seeking practice opportunities
	Evaluating your learning	1. Self-monitoring 2. Self-evaluating
Affective Strategies	Lowering your anxiety	1. Using progressive relaxation 2. Using music, deep breathing or meditation 3. Using laughter
	Encouraging yourself	1. Making positive statements 2. Taking risks wisely 3. Rewarding yourself
	Taking your emotional temperature	1. Listening to your body 2. Using a checklist 3. Writing a language learning diary 4. Discussing your feelings with someone else

TABLE II
INDIRECT STRATEGIES (continued)

	Asking questions	1. Asking for clarification or verification 2. Asking for correction
Social Strategies	Cooperating with others	1. Cooperating with peers 2. Cooperating with proficient users of the new language
	Empathizing with others	1. Developing cultural understanding 2. Becoming aware of others' thoughts and feelings

Note: From R. L. Oxford (1990). *Language learning strategies: What every teacher should know.* New York: Newbury House/Harper & Row.

ing).

The following discussion highlights key research results and points out some conspicuous holes in the current understanding of styles, strategies, and aptitude. This discussion does not attempt to appear "balanced" in terms of equal treatment of each construct, or of every component of each construct. The research itself is spotty, fragmented, and uneven; thus any research summary will reflect this situation. In the research discussion, the first focus is on styles, then strategies, then relationships between the two, and finally, relationships between styles/strategies and aptitude.

Results of Style Research

A good deal of foreign language education research has been conducted on styles, but this research has tended to concentrate on only a few style aspects, most notably field independence-dependence, competitiveness-cooperativeness-independence, and reflection-impulsivity. This summary presents what we know about an array of style dimensions, with varying amounts of emphasis given to the different dimensions. Cognitive style, in all its different manifestations, is more widely researched than most aspects of learning style. However, when researchers have investigated what they initially thought were purely cognitive dimensions such as field dependence-independence, they often found that cognitive aspects merged with social and affective aspects of style.

Field Independence-Dependence

Over time, the field independence-dependence (FI-FD) dimension has been spread out to encompass many related variables (Willing, 1988). Researchers began testing how individuals established the upright in tests involving tilted frames or tilted rooms, with field dependent people relying upon the external frames and field independent people on internal standards. The construct was later enlarged to cover the tendency to separate a small item from a larger context (disembedding); field dependent individuals had more difficulty in overcoming the context than did field independent people. Then the FI-FD dimension was expanded to include the articulated or analytical versus global field approach: Field depend-

ent persons, who processed information more globally, were less likely to analyze, restructure, and solve a given problem than were field independent individuals. Recently, researchers have looked at the FI-FD phenomenon in reference to social behavior, finding that field dependent people were more accepting of social influence and more competent and self-confident in interpersonal relations than field independent people. For more details see Gardner, Jackson, and Messick (1960), Goodenough (1976), Goodenough and Karp (1961), and Witkin and Goodenough (1977).

Contrary to popular belief, individuals are not fixed in their field independence or dependence (Willing, 1988). Field Independent (FI) people shift more often and more naturally to a Field Dependent (FD) approach than FD people switch to a FI approach. Specific training has been shown to affect FI-FD style (Berry, 1981).

Sex differences and cultural variations have been found for FI-FD style. As adolescents and adults, males perform somewhat more field independently than do females (Shipman & Shipman, 1985). According to Witkin and Berry (1975), in some instances these sex differences may be culturally inculcated.[3]

Although the FI-FD dimension seems to differentiate between individuals in some areas of intellectual and interpersonal functioning, the relationship between this dimension and (native language) verbal performance is not clear-cut. Some studies have shown that FI and FD individuals do not differ on tests of vocabulary and comprehension (Goodenough & Karp, 1961). Other studies have found that FI individuals are superior on tests that measure speech perception (DeFazio, 1973), sentence disambiguation, and grammatical transformation (Witkin & Goodenough, 1977). These mixed findings have generally been attributed to differences in the degree of analytic skill required by the task. Vocabulary and comprehension tests might require less analytic ability than speech perception, sentence disambiguation, and grammatical transformation.

Similarly mixed findings have been found in investigations of FI-FD learning style and foreign language learning. For example, Bialystok and Fröhlich (1978) failed to find differences between FI and FD individuals in foreign language reading, listening, and writing. Tucker, Hamayan, and Genesee (1976) found no significant relationship between FI style and foreign language reading, listen-

ing, and speaking. They did find, however, that FI style significantly predicted higher overall foreign language achievement and higher performance on a general language achievement test. This raises the question of measurement effects, especially if the achievement measures were discrete-point and analytically oriented. Naiman, Fröhlich, Stern, and Todesco (1978) discovered that FI individuals performed better than FD individuals on tests of foreign language listening skills, paralleling DeFazio's (1973) finding that FI individuals are superior in native language speech perception. In a study by Hansen and Stansfield (1981), FI style was found to be most strongly associated with linguistic (grammatical) competence and integrative competence in Spanish, while the relationship with communicative competence was minimal.[4] Parry (1984) found a strong link between field independence and various aspects of foreign language proficiency (reading, grammar, integrative/cloze skill) and foreign language achievement (class grades).

Although some sporadic advantages appear for FI language learners, especially in language skills that require analytical reasoning, it seems there is no consistent advantage for FI individuals over FD individuals in terms of ultimate language proficiency or achievement. It might be that FD individuals, with their interpersonal and global orientation, have some edge in nonanalytic aspects of overall communicative competence. Greater standardization of constructs and of measurement methodology is needed to clarify the FI-FD question in future research on language proficiency.

Dimensions Sometimes Related to Field Independence-Dependence

As mentioned earlier, a number of other style dimensions have been shown to be related to the FI-FD dimension, and one has even been viewed as part of, or even identical with, FI-FD. Some of these will be discussed briefly: analytic-global processing; brain hemisphericity; the Kolb dimensions of reflective observation, active experimentation, concrete experience, and abstract conceptualization; tolerance for ambiguity; and constricted-flexible control.

Analytic-global processing. Field independence involves analytic reasoning, whereas field dependence involves global reasoning, as described above. In fact, "field dependence-independence is

currently treated by the Witkin group [of researchers] as the perceptual aspect of a more pervasive analytic-global cognitive style," according to Kogan (1971, p. 250). Certain analytic subtests of intelligence tests are correlated with the FI-FD dimension, according to Shipman and Shipman (1985), thus supporting the linkage between analytic-global and FI-FD.

Sigel and his colleagues demonstrated sex differences in analytic-global style, with boys employing more descriptive (analytic) responses than girls, and girls using more relational (global) responses (Sigel, Jarman, & Hanesian, 1967). Furthermore, boys' analytic tendencies were related to high scores on cautiousness, learning skills, achievement orientation, independence, and activity; girls' global responses were related to low scores on cautiousness, independence, and activity.

Sigel and Coop (1974) recommended that teachers help learners access both analytic and global tendencies, suiting those modes to different learning situations as needed. This recommendation, of course, implies that learners do not have to be labeled as permanently analytic or global.

While little research appears to have been conducted on analytic-global processing in learning a new language, some evidence does exist. Analytic reasoning often dominates the formal academic foreign language learning arena (Oxford & Nyikos, 1989), as reflected in preferences of learners. Politzer (undated) found that foreign graduate students in engineering and science classes (who might be expected to use analytical reasoning in learning English as a second language) outperformed their peers in terms of grammatical competence.

Brain hemisphericity. An exciting but controversial research area for language learning is that of brain hemisphericity (laterality), which Willing (1988) and Hartnett (1981) both link closely with the FI-FD dimension and with the analytic-global aspect. So-called "left-brain" people (whose left brain hemisphere is dominant) may be more field independent and analytic, whereas so-called "right-brain" individuals may be more field dependent and global, according to some researchers. TABLE III lists characteristics purportedly attributable to the two hemispheres.

It was formerly thought that the left hemisphere was the seat of

TABLE III
FUNCTIONS OF THE BRAIN HEMISPHERES

A survey of the research concerning the specialized functions of the right and left cerebral hemispheres yielded the following list.

LEFT	*RIGHT*
• responding to verbal instructions	• responding to visual and kinesthetic instructions
• systematic and controlled in experimenting/learning/ thinking	• playful and loose in experimenting/learning/ thinking
• inhibited emotionally	• responds with emotion/ feeling
• dependent upon words for meaning	• interprets body language easily
• produces logical ideas/ thoughts	• produces humorous ideas/ thoughts
• processes verbal stimuli	• processes kinesthetic stimuli
• processes information logically	• processes information subjectively
• serious, systematic in solving problems	• playful in solving problems, uses humor, experiments
• receptive; concrete thinking	• self-acting; abstract thinking
• likes to have definite plan	• likes to improvise
• little use of metaphors and analogies	• frequent use of metaphors and analogies
• responsive to logical, verbal appeals	• responsive to emotional appeals
• deals with one problem at a time, sequentially	• deals simultaneously with several problems at a time
• critical and analytical in reading, listening, etc.	• creative, synthesizing, associating, applying in reading, etc.
• logical in solving problems	• intuitive in solving problems
• gives instructions/information verbally	• gives much information through movement, gesture, etc.
• uses language in remembering	• uses images in remembering
• recognizing/remembering names	• recognizing, remembering faces

Adapted from University of Pittsburgh, Program in Curriculum and Supervision (C & S) - Learning Styles (undated)

verbal information processing, whereas the right hemisphere was the place where visual and spatial images were processed. We now believe that both hemispheres may process language, but in different ways. The left hemisphere seems to process language through analysis and abstraction, while the right hemisphere appears to recognize words as auditory or visual patterns through gestalt-like template matching (Willing, 1988).

Leaver (1986) found that purported *right-brain processors* were better language learners at lower proficiency levels, where the focus was on intonation and rhythms; so-called *left-brain processors* were better language learners at higher proficiency levels, which called for greater control and analysis. She also discovered that students who are called *integrated* (hemispherically balanced) did well at language learning.

New information about hemisphericity is likely to become available from Leaver and other researchers in the next few years. Brain hemisphericity is a vast, complex, and problematic area of neurolinguistic research that has been applied to foreign and second language learning, often in a disturbingly oversimplified way. Difficulties exist in measuring hemisphericity preferences on different tasks, in determining individual differences in hemisphericity, in understanding how inter-hemispheric coordination operates, and in understanding how all of this relates to the learning of a second or foreign language. This research area is still in its infancy, and we will watch it grow with an attitude of cautious interest.

Kolb's dimensions. The cognitive style dimensions listed by Kolb (1984)—*reflective observation* (watching) versus *active experimentation* (doing), and *concrete experience* (feeling) versus *abstract conceptualization* (thinking)—are widely known, largely due to the popularity of Kolb's Learning Style Inventory. The dimension of concrete experience versus abstract conceptualization closely resembles the distinction between field dependence and field independence (Willing, 1988), and Kolb himself acknowledges his debt to Witkin, one of the early FI-FD researchers. Not surprisingly, Hainer (1986) demonstrated that Kolb's categories correlate regularly with FI and FD in ESL schoolchildren. The Kolb model also forms the basis of the 4MAT curriculum design system (McCarthy, 1980) that is used (at the Foreign Service Institute, in the Arlington

County (VA) public schools, and in other places) for developing syllabi used in child and adult language training.

Tolerance for ambiguity. Tolerance for ambiguity is sometimes viewed as a component of style, though it is also occasionally classified as an affective or personality variable. It has often been asserted to relate to success in foreign language learning (Naiman, Fröhlich, & Todesco, 1975; Reiss, 1981, 1985; Rubin & Thompson, 1982), largely because learning a new language can be a highly ambiguous endeavor. In one study, Naiman, Fröhlich, Stern, and Todesco (1978) discovered that tolerance for ambiguity was one of the two factors that most accurately predicted language learning success. Other researchers found that language learners who were tolerant of ambiguity were more successful in specific language tasks (e.g., Chapelle, 1983) and seemed to use somewhat more effective learning strategies than learners who were less tolerant of ambiguity (Ehrman & Oxford, 1988, 1989; Oxford & Ehrman, 1989). Witkin and Goodenough (1977) found that field independent individuals were more tolerant of ambiguous situations; and as was noted above, some studies have shown such individuals to be superior in overall language proficiency, grammatical competence, and listening skill.

Constricted-flexible control. Constricted-flexible control refers to susceptibility to distraction or cognitive interference. It involves the extent to which an individual focuses attention on relevant cues and actively inhibits interfering cues. This style dimension appeared to be associated with field independence for women but not for men in a study by Gardner and Lambert (1959). Naiman et al. (1978) suggested that successful foreign language learners must have flexible control, i.e., must have low-interference tendencies, so as to avoid interference by the first language and the overgeneralization that results. Parry (1984) found that flexible control did indeed significantly predict foreign language proficiency, but little other research exists about this variable.

Competitiveness - Cooperativeness - Independence

So far, the style discussion has centered on field independence-dependence and related dimensions. Other aspects of style are being tested. Three such dimensions are competitiveness-cooperation-

independence. (This use of *independence* is different from the *field independent* style described earlier in that it refers to a preference for learning by oneself.) It is rare that all three of these elements—competition, cooperation, and independence—are considered in the same study, although there is no theoretical reason why they should not be. There is much more information available on the first two, competition and cooperation, than on the cooperation and independence contrast.

Competitive people are stimulated by winning a reward and beating someone else, whereas cooperative people prefer working with others in a mutually supportive situation. Competition is strongly reinforced by the educational establishment in our culture. Schools often pit students against each other in competition for approval, attention, and grades (Kohn, 1987). Perhaps because of the competitive nature of schools, language learners rarely report using social strategies spontaneously, and they do not express much interest in working with others (Reid, 1987; O'Malley, Chamot, Stewner-Manzanares, Kupper, & Russo, 1985; O'Malley, Chamot, Stewner-Manzanares, Russo, & Kupper, 1985). In language learning, as in other learning areas, competition is common and can result in positive tension. More often, however, it results in anxiety, feelings of inadequacy, guilt, hostility, withdrawal, fear of failure, and an overly strong desire for approval (Bailey, 1983).

In contrast to competitive learning, cooperative learning involves work in small groups that are positively interdependent and in which each student depends on and is accountable to others and is concerned with others' welfare (Kagan, 1986; Kohn, 1987). Cooperative learning involves two primary features, cooperative task structure and cooperative reward structure (Jacob & Mattson, 1987). A great deal of research, both in and out of the foreign language learning area, shows a cognitive, affective, and social payoff from cooperative learning.[8]

Cooperative learning is usually an instructional strategy or style that the teacher instigates; it is less often inspired by a student's natural inclination (at least among adolescents and adults in our competition-oriented society). The cooperative learning style may not come naturally to all learners. On their own, without any special encouragement or training, second language learners do not typi-

cally report cooperative style preference (e.g., Reid, 1987). However, this might differ by sex. Language learning studies reviewed by Oxford, Nyikos, and Ehrman (1988) suggested that women may tend to use more social and more communicative learning strategies than men. This finding seems to reflect a fairly consistent difference in the underlying learning style; women tend to be more cooperative and less competitive than men in many learning situations. In turn, this apparent difference in learning styles reflects a still broader difference between the sexes: Females were shown to be superior to, or at least very different from, males in many social skills; females show a more cooperative orientation; males exhibited a more competitive orientation (in general, not just in learning situations) (Maccoby & Jacklin, 1974). Cross-cultural studies need to be done indicating whether sex differences in competition versus cooperation are universal or specific to certain societies. In addition, researchers should examine whether current socioeconomic changes involving working women will change the image of the female as more cooperative and less competitive than the male.

Very little has been studied about the second contrast, cooperation versus independence. Reid (1987) found that ESL learners from many countries generally preferred working by themselves rather than with others. Certainly ethnic and cultural factors must have affected this finding, but exactly what those factors are and how they operate remains to be explored. Also, how women's seeming tendency toward cooperativeness fits in with this finding is uncertain.

In short, the stylistic dimensions of competition, cooperation, and independence deserve greater attention than they have received from researchers and teachers. For language learning, they would seem to have strong and far-reaching implications.

Reflection-Impulsivity

Another well-known style dimension is reflection-impulsivity. As the term suggests, this dimension embodies the polar opposites of slower, more systematic investigation of hypotheses (reflection) versus quick acceptance of initially selected hypotheses (impulsivity). Reflective subjects tend to be both slow and accurate, while impulsive subjects tend to be both fast and inaccurate. Of course, other possibilities exist: fast-accurate and slow-inaccurate. Together,

these four possibilities—reflective, impulsive, fast-accurate, and slow-inaccurate—comprise the range of what is often called *conceptual tempo* (Oxford & McKinney, 1976). Tasks used in the measurement of these modes must involve a degree of built-in response uncertainty.

Sex differences have usually been nonsignificant in regard to these modes; when differences have been evident, females have appeared slightly more reflective (Shipman & Shipman, 1985), a finding that contradicts the finding of girls' low scores for cautiousness in the study by Sigel, Jarman, and Hanesian (1967).

Most studies focus on reflection-impulsivity, and more specifically on two aspects of this dimension: response speed (sometimes called response latency) and response accuracy. In foreign language research, impulsive subjects posed problems because of their premature, inaccurate responses, whereas reflective subjects have performed much more effectively. As expected, Parry (1984) found that reflection rather than impulsivity was predictive of foreign language proficiency. This finding echoes 20 years of research favoring reflectives outside of the foreign language field. However, Ehrman and Oxford (1988) have documented that an overly strong concern for accurate or even perfect language performance can lead to destructive anxiety, which in turn can diminish performance. Investigators such as Meredith (1976) and Messer (1976) have demonstrated the effectiveness of an imposed latency period, i.e., a brief pause that forces impulsive subjects to slow down before giving a response, and that also gives reflective subjects time to formulate and mentally test their answers.

Other Style Dimensions

Other style dimensions are potentially relevant for learning a new language. These include the following: sensory modality preferences, breadth of categorization, cognitive complexity-simplicity, leveling-sharpening, and the MBTI dimensions (extraversion-introversion, sensing-intuition, thinking-feeling, and judging-perceiving). These have not yet been the subject of extensive research in the language learning field.

Sensory modality preferences. Sensory modality preferences are an important dimension of style. Reid (1987) studied the sensory

modality preferences and other aspects of learning style of ESL learners. She found that visual, auditory, kinesthetic, and tactile preferences were strongly influenced by national origin. Koreans were the most visual in their preferences. Japanese were the least auditory and the least kinesthetic of all nationalities. ESL students of most nationalities were strongly kinesthetic and tactile in their preferences. Although native speakers of English, who served as a kind of comparison group, showed a strong liking for kinesthetic learning, as did the ESL students, native speakers of English did not demonstrate the preference for tactile learning found in ESL students.

According to Dunn and Dunn (1972), 40% of U. S. schoolchildren have been claimed to be so-called visual learners, while 20-30% learn auditorily, and the remaining 30-40% learn using a combination of senses (tactile/kinesthetic, visual/tactile, visual/auditory, and so on). Semple (1982) suggests that children may progress from the kinesthetic sense to the visual, with auditory preferences constituting a possible later development. In some contexts, the preferred or favored sense may not be the one that most efficiently receives or processes the information (Willing, 1988). The area of sensory modality preferences is not yet highly developed, and the findings reported here must be viewed cautiously.

Breadth of categorization. Breadth of categorization is another style dimension that has been examined to some extent in the language learning field. By definition, broad categorizers categorize in a loose, general fashion, while narrow categorizers categorize in a tighter, more constricted fashion (Naiman, Fröhlich, Stern, & Todesco, 1978). The style of *conceptual differentiation*, referring to the number of varied aspects used to categorize differences and similarities, is highly related to breadth of categorization. Narrow categorizers tend to use a high degree of conceptual differentiation, while broad categorizers do not. Naiman et al. (1978) asserted that the broad categorizer would risk including items erroneously in overly broad categories, while the narrow categorizer would make overly fine distinctions that are inefficient. Parry (1984) suggested that a middle ground between broad and narrow categorization might be the most beneficial to foreign language learning. In his own study, however, Parry (1984) found that breadth of categorization

did not significantly predict language proficiency.

Cognitive complexity-simplicity. A related style dimension, cognitive complexity-simplicity, consists of differences in the tendency to view the world, especially the social world, in a multidimensional and discriminating way (Messick, 1976). A cognitively complex person views the world in a highly differentiated and flexibly integrated manner, according to the definition of this construct. Parry (1984) hypothesized that more cognitively complex students would approach foreign language learning in a more highly specific and flexible way; they would be more able to deal with the difficulties inherent in language learning; and they would surpass more cognitively simple students in terms of oral proficiency. In his study, however, these hypotheses were not upheld. Cognitive complexity-simplicity, as currently measured, does not appear to influence foreign language learning.

Leveling-sharpening. Leveling-sharpening, another style dimension, concerns the blurring versus the magnifying of differences between stimuli in memory. Levelers blur the differences, while sharpeners magnify them. Sharpeners have been shown by research to have superior performance on long-term memory tasks, according to Parry (1984). His study found that of all the style dimensions examined, the leveling-sharpening dimension was the most predictive of foreign language proficiency; sharpeners showed greater proficiency than levelers. Further research on this style dimension of leveling-sharpening is needed.

MBTI style dimensions. Style dimensions on the Myers-Briggs Type Indicator (MBTI), which is based on Carl Jung's original typology of characteristics, are extraversion-introversion, sensing-intuition, thinking-feeling, and judging-perceiving. These dimensions cover both cognitive and affective elements of what is sometimes called "psychological type" and are often viewed as four primary aspects of learning style (see Lawrence, 1984). *Extraverts* (on the MBTI) are energized through interaction with others, and they are focused on the external world, whereas *introverts* are energized by solitary activities, and they are focused on the internal world. *Sensing types* are practical, factual, and oriented toward sensory data; *intuitives* look for the big picture and are aware of abstract relationships and future possibilities. *Thinkers* make decisions on the

basis of analysis and objectivity, while *feelers* make decisions on the basis of human interaction, values, and feelings. *Judgers* look for closure and organization, while *perceivers* want to keep options open and are not too concerned with structure. These labels are used in a particular and not always intuitively obvious way by MBTI experts. According to the theory underlying the MBTI, every person is a combination of these four dimensions, with a preference for one of the two poles of each dimension. Individuals who have developed their capabilities are able to access both the less preferred pole of a given dimension and the preferred side with which they are naturally more comfortable (Myers & McCaulley, 1985).

Ehrman and Oxford (1988, 1989) have worked extensively with these style dimensions, in the context of adult language learning, using both quantitative and qualitative research methods. Some of their results follow.

First, the thinking-feeling dimension emerged as especially important in understanding language learning success or failure. Specifically, the sensitivity and interpersonal connectedness of the feelers seemed to relate strongly to success in an intensive foreign language program, thus confirming the importance of affective and social factors in language learning. The salience of the feeling pole of the thinking-feeling dimension puts to rest the consideration that learning in general, and language learning in particular, might be a purely cognitive process. Second, perceivers' lack of need to reach immediate closure also seemed to have a major influence on language learning success. An openness to new information without forced, premature closure appeared to be part of the continuous quest for meaning, which is essential to the development of language skill. Third, introversion also seemed to relate to language learning success, although this might have occurred because of the classroom context; extraversion might have had a more positive influence in a less formal language acquisition environment. Finally, a small but important advantage was shown for intuition, as opposed to sensing, in terms of ultimate language performance. Intuition appeared to be related to the ability to build and refine broad models of the target language. A discussion of key findings is found in the section of this chapter titled "Relationships Between Styles and Strategies."

Intercorrelations among Style Dimensions

Interrelationships among different dimensions of style would seem to be important in understanding the nature of that broad construct. Most researchers have looked at only one or two dimensions at a given time, so there is little information on intercorrelations. Parry's (1984) study, however, investigated multiple aspects of style, but most of the significant intercorrelations within the style dimensions were low and inconclusive. Ehrman and Oxford (1988) discuss briefly the probable interrelationships among various style aspects on the MBTI; for details see that paper.

Relative Contributions of Style Dimensions to Language Proficiency

Naturally, it is very important to consider the relative contributions of various style dimensions to foreign language proficiency. Few studies have explored this question using a variety of learning style dimensions. Parry's (1984) investigation of the multiple dimensions of learning style found that higher levels of proficiency on grammar and reading comprehension tasks, greater integrative skill on a cloze measure, and higher foreign language grades were obtained by students who were sharpeners, field independent, reflective, and flexible in their cognitive control. As might be expected, subjects who tended to be sharpeners and reflectives tended also to be more fluent in written discourse, more flexible in their use of linguistic structures, and more original in written expression. Flexible cognitive control seemed to influence flexibility of language use in Parry's study.

Neither breadth of categorization nor cognitive complexity-simplicity were significant predictors of any kind of foreign language proficiency. Parry also found that style accounted for a significant proportion of the variability in foreign language proficiency over and above the effects of intelligence. Of course, this is only one study, so these results need replication.

Summary of Style Research

- Field independent (FI) people, compared with field dependent (FD) people, are less dependent on the environment and other people for cues, more analytical, more tolerant of ambiguity, and less socially competent. Males tend to be more FI, and females more FD; this might reflect socialization. Cross-cultural differences in the FI-FD dimension exist; people in more authoritarian societies are more field dependent. There is no consistent advantage for FI individuals over FD individuals in terms of language proficiency or achievement, although FI language learners tend to show advantages in some studies, particularly in analytical language tasks.

- In preliminary hemisphericity testing, left-right brain hemisphericity appears, in some studies, to be related to FI-FD and to analytic-global processing. It appears that so-called left-brain processing *might* be more helpful for advanced language learners and alleged right-brain processing for beginning learners (depending on the nature of the course). Difficulties in measurement persist in this research area.

- Cooperative learning has consistently shown advantages over competitive learning. However, most students do not report a cooperative style preference in language learning situations. The role of sex differences needs to be explored, because females are often assessed as more cooperative and less competitive than men. Cultural variation is also an important issue in competition-cooperation.

- Reflective learners are consistently more skillful than impulsive learners. Reflection can be encouraged through certain kinds of training and through forcing learners to wait before they answer (imposed latency).

- Sensory modality preferences—visual, auditory, kinesthetic, and tactile—are important to learning. Preference for certain

senses may be influenced by cultural and ethnic factors and by developmental level. The preferred sense may not be the one that most efficiently processes the information.

- Other style dimensions, such as broad-narrow categorization, cognitive complexity-simplicity, and leveling-sharpening (i.e., blurring or magnifying differences between stimuli in memory), deserve further exploration.

- Certain style dimensions are more predictive of proficiency than others, but more research is needed. It appears that field independence, sharpening, flexible control, and reflection might be significant predictors of proficiency. Research suggests that sensitivity to feelings, and lack of need for immediate closure, along with some degree of intuitiveness and perhaps introversion, might seem to predict success in intensive language instruction. On the other hand, it might be posited that extraversion would be more useful than introversion in informal language acquisition settings. Further research is called for to verify these findings, but the style dimensions noted here might be considered in the construction of a battery of tests to determine the predictors of language learning success.

- Although several style dimensions appear to be interrelated or overlapping, more data are needed to verify and explain these relationships.

Results of Strategy Research

The research field of language learning strategies is new and growing. Many questions remain to be answered. Initial research in the last ten to fifteen years provides interesting information about strategies used. The discussion of strategies that follows is very different from the earlier discussion of styles, because strategy research and style investigations have been conducted in contrasting ways. Strategy investigations focus on different strategies in the same study, whereas style studies have typically tested a single style

dimension. Therefore, it is not possible to focus here on one strategy or one strategy type at a time, though it was possible to examine style dimensions one by one. The following discussion will cover three key aspects of strategies: strategies used by successful language learners, frequency of use of strategies, and factors of strategy selection.

Strategies of Successful Language Learners

One substantiated hypothesis is that successful language learners in general use more and better learning strategies than do poor language learners (Rubin, 1975; Naiman, Fröhlich, & Todesco, 1975; Stern, 1983; Ramirez, 1986). In addition, research has shown that more effective language learners use more appropriate strategies than do less effective learners in each of the four language skills (e.g., Tyacke & Mendelsohn, 1986; Hosenfeld, 1977b; Papalia & Zampogna, 1977). In the sense that expert language learners employ useful strategies more often than do others, language learning strategies might be said to predict ultimate language skill or proficiency. However, direct causal links have not been explored in detail.

What are some of the strategies shown to characterize the best language learners? Rubin (1975) suggested that the "good" language learner is a willing and accurate guesser; has a strong, persevering drive to communicate; is often uninhibited and willing to make mistakes in order to learn or communicate; focuses on form by looking for patterns; takes advantage of all practice opportunities; monitors his or her own speech and that of others; and pays attention to meaning. Reiss (1985) found that most of these characteristics, except lack of inhibition, actually did hold up in later empirical research. Naiman, Fröhlich, and Todesco (1975) named six strategies of successful language learners: selecting language situations that allow one's preferences to be used; actively involving oneself in language learning; seeing language as both a rule system and a means of communication; extending and revising one's understanding of the language; learning to think in the language; and addressing the affective demands of language learning.

Oxford and Nyikos (1989) found a strong association between strategy choice and self-perceived proficiency in a large university

sample, with greater strategy use accompanying perceptions of higher proficiency in listening, reading, and speaking, but not in writing. Ehrman and Oxford (1988) examined the strategies (and the styles, as described earlier) of more successful and less successful language learners, with success being defined by ratings of their end-of-training performance. These researchers found for the most part that strategies used by learners closely mirrored their preferred style; e.g., people labeled as thinkers more frequently used analytic strategies, while those assessed to be feelers more often tapped interpersonal, global, and social strategies. However, some learners were able, through training, external suggestion, or conscious effort, to access and use less-preferred strategies—thus gaining more flexibility and power as language learners.

Frequency of Use of Various Strategy Types

Researchers have been interested in the frequency with which certain language learning strategies are used. The most detailed studies on strategy frequency used several different data collection techniques and different sample groups of students, including high school and military ESL students and high school and university foreign language students (Chamot, O'Malley, Kupper, & Impink-Hernandez, 1987; O'Malley, Chamot, Stewner-Manzanares, Kupper, & Russo, 1985; O'Malley, Chamot, Stewner-Manzanares, Russo, & Kupper, 1985). The researchers found that cognitive strategies (e.g., repetition and note-taking) are used more often than metacognitive strategies; that the most common metacognitive strategies involve planning, with little use of self-monitoring or self-evaluation; and that socio-affective strategies are infrequently reported. Nyikos and Oxford (forthcoming) and Oxford and Nyikos (1989) reported heavy use of analytic, formal practice strategies in the university setting, which often stresses discrete-point testing and grammar-based instruction; and McGroarty (1987) found a similar pattern of strategies. The similarity was probably due to student habit, even though the particular language courses attempted to emphasize communicative practice. Studies of adult foreign language learners who need to use the new language for their work show a different pattern, with greater use of strategies for searching for and communicating meaning (e.g., Ehrman & Oxford, 1988;

Oxford & Ehrman, 1989) than was found in university studies. In short, there is no single, most common pattern of strategy use across all groups. This implies that a number of important factors influence strategy selection.

The frequent usage of various strategies or strategy groupings does not necessarily indicate that these are the most appropriate strategies. A widely used strategy, such as rote memorization, may not be beneficial. In strategy testing, by discriminating between successful and unsuccessful language learners (in varied settings), researchers would better understand the use and importance of learning strategies.

Factors Affecting Strategy Choice

Many factors influence learning strategy choice: language being learned; duration; degree of metacognitive awareness; age; sex; affective variables, such as attitudes, motivational level/intensity, language learning goals, motivational orientation, and personality characteristics; career orientation; national origin; language teaching methods; and task requirements.[6]

The foreign language. The language being studied has an influence on the strategies that are used. Chamot, O'Malley, Kupper, and Impink-Hernandez (1987) found that students of Russian reported greater strategy use than students of Spanish. Politzer (1983), in examining the learning strategies of students of French, Spanish, and German, discovered that students of Spanish engaged in fewer positive strategies than did students of the other languages. It is likely, however, that the language of study interacts with a host of other variables and that a key explanatory factor might be "population bias." For instance, because Russian is assumed to be very difficult for English speakers, and Spanish is assumed to be among the easiest languages for an English speaker, it is possible that Russian will be chosen for study primarily by highly motivated, strategy-wise students, whereas a broader range of students may select Spanish. Teachers of various languages, especially if they are native speakers, may use different teaching methods, which are likely to influence students' learning strategies. Students might be learning different languages for different purposes, which will be reflected in choice of strategies.

Duration. Duration refers to course level and number of years of language study and does not necessarily relate to the proficiency level. As language students progress to higher course levels, they use somewhat different strategies, according to several researchers. For instance, Politzer (1983) discovered that course level influenced foreign language learning behaviors (strategies); higher-level students use more effective strategies. Chamot, O'Malley, Kupper, and Impink-Hernandez (1987) found that cognitive strategy use decreased and metacognitive strategy use increased as the foreign language course level increased, but social-affective strategy use remained very low across all course levels (possibly due to measurement issues). The specific kinds of cognitive and metacognitive strategies also shifted somewhat across course levels. These results might be interpreted to suggest that only the successful learners persevered to take higher level courses (i.e., a self-selection process). Alternatively, these results might also imply some kind of behavioral development over time, possibly in response to changing task demands or because of greater sophistication as learners.

McDonough and McNerney (reported by Tyacke & Mendelsohn, 1986) discovered that more advanced language learners diminished their use of less useful or less relevant strategies and geared their strategy use more directly to the language task at hand. In another study (Nyikos, 1987), university students showed developmental trends in strategy use, with decreasing and increasing use of various strategies as the semesters progressed. Tyacke and Mendelsohn's diary study (1986) showed that lower-level students generally depended much more on their teacher and on strategies related to the linguistic code than did higher-level students.

Bialystok (1981) found differences in strategy use as learners advanced in French. Formal practice with rules and forms was decreasingly used as students advanced, but functional practice with authentic, communicative language displayed no such limitation. The findings of Nyikos and Oxford (forthcoming) support Bialystok's result. These researchers discovered that foreign language students who had studied the new language for a minimum of four or five years used communication-oriented strategies (i.e., functional practice strategies, conversational/input elicitation strategies) significantly more often than did less experienced students.

Advancement in course level or years of study does not necessarily mean that students use more appropriate or more effective strategies in every instance. Cohen and Aphek (1981), in studying English speakers who were learning Hebrew, discovered that both helpful and unhelpful learning strategies appeared across course levels. Nevertheless, most of the research does indeed show that, in general, the more advanced the language learner, the more appropriate the strategies will be for a given task and learner. At least two possible explanations exist. First, language students might spontaneously develop new and more task-relevant strategies as they become more advanced. Second, students with less appropriate strategies might perform worse than students with more appropriate strategies. Therefore, the former drop out of language study before reaching higher level courses.

Degree of metacognitive awareness. Metacognitive awareness also influences strategy use. Learner's knowledge about themselves and about their own learning process can affect their use of language learning strategies (Wenden, 1986). For instance, the kinds of language used, proficiency level, the outcomes of learning, and learners' own proficiency, feelings, aptitude, physical state, age, learning style, social role, character, and personal theory of language learning all play a part.

Researchers dispute learners' level of strategy awareness. Nyikos (1987) found that learners used only a narrow range of strategies and were generally unaware of the strategies they used. Tyacke and Mendelsohn (1986) reported a diary study in which only one of the learners showed increasing awareness of strategies as they became more advanced. In contrast, Chamot, O'Malley, Kupper, and Impink-Hernandez (1987) discovered that even ineffective learners were aware of and used a number of strategies, with the only difference between effective and ineffective students being that the effective ones reported greater frequency and greater range of strategy use. These conflicting results might be explained by use of different research methods in the studies above; certainly more research is needed here.

Age. Few studies have been designed to focus on the effect of age on choice of language learning strategies, although age (albeit a rather narrow age span) is sometimes implied by course level.

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Ehrman and Oxford (1989) and Oxford (1986) studied adult language learners, who seemed to use somewhat more sophisticated language learning strategies than did younger learners in other studies; the motivational orientation of the adult learners, who were learning languages for immediate career purposes, might have been a greater factor than age. Leaver (forthcoming) examined the results of age as a factor in strategy choice by comparing the strategies used by a small number of adults and children learning foreign languages. She concluded that their differences in strategies were due not to age but to the way in which these individuals gained their language skills: the younger subjects in a natural way, and the adults in a classroom setting. Advantages of older and younger language learners are described in Ehrman (1987), Oxford (1982), and Schleppegrell (1987). Longitudinal studies are needed to understand more completely the effects of age on learning languages and on strategy use.

Sex. Most researchers have not investigated sex differences in language learning strategy use, or have ignored the sex differences they found. Politzer (1983) reported that females used social learning strategies significantly more often than males—a difference that was dismissed without any explanation, but that might be associated with women's stronger social orientation.

Sex differences in strategy use may be more important and more prevalent than previously thought. In a study of adult language learners, Ehrman and Oxford (1989) and Oxford and Ehrman (1989) found that females, as compared to males, reported significantly greater use of language learning strategies in four categories: general study strategies, functional practice (authentic language use) strategies, strategies for searching for and communicating meaning, and self-management strategies. Oxford and Nyikos (1989) found that females used language learning strategies more often in three of five strategy areas: formal rule-based practice strategies, general study strategies, and conversational/input elicitation strategies. Nyikos (1987) discovered significant sex differences in her training study of the use of mnemonic strategies for German vocabulary learning among university foreign language students. After training, men outperformed women in the color-plus-picture mnemonic combination, which was explained as potentially relating to men's

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greater visual-spatial acuity. However, women surpassed men in the color-only condition, which was explained by women's documented interest in color as an attractor.

In short, the sex difference findings to date show that in typical language learning situations women use significantly more learning strategies than men and use them more often. After strategy training, men and women both show distinct strategy strengths. Some of the sex differences found in various studies (summarized in Oxford, Nyikos & Ehrman, 1988) might have been associated with women's greater social orientation, stronger verbal skills (including proper rule usage), and greater conformity to norms, both linguistic and academic, demonstrated by earlier research.

Attitudes. Attitudes strongly influence language learning in general and therefore are likely to influence the choice of strategies. Bialystok (1981) found that learners' attitude was highly influential in choice of language learning strategies—more influential than language aptitude. Little other empirical research has been done on the influence of attitudes on strategy choice, but Wenden (1987) has convincingly argued that unless negative attitudes toward learners' self-direction are changed, no amount of training in better learning strategies will have a sustained effect on learning strategy use.

Motivational level/intensity. "The prime determining factor [in language learning success] is motivation" (Gardner, 1985, p. 85), because motivation (along with attitudes) determines the extent of active personal engagement in language learning. Despite this well-known fact, few language learning strategy studies have examined the role of motivational level/intensity on strategy choice.

In one of these few studies on variables (Oxford & Nyikos, 1989), a key finding was that motivational level had the most powerful influence on reported use of language learning strategies. Motivational level significantly affected the tendency of language students to use (or not use) four different sets of strategies out of five: formal rule-related practice strategies, functional practice (authentic language use) strategies, general study strategies, and conversational/input elicitation strategies. Highly motivated learners used these types of strategies significantly more often than did less motivated learners.

Even when communication-oriented strategies are encouraged,

students may reject those strategies—possibly because of low motivation. University learners of Spanish, taught through communicative methods and in naturalistic practice situations, continued to employ highly traditional language learning strategies (such as using the dictionary to learn words) and avoided authentic practice (McGroarty, 1987). It might be speculated that the problem was low motivation for language learning. Complementary explanations might be that the students were not able to switch gears when they encountered a new language teaching method, or their language learning goal might not have been communicative competence.

Language learning goals and motivational orientation. In the university study (Oxford & Nyikos, 1989) mentioned above, the most popularly used strategies were the formal rule-related practice strategies and general study strategies. Least popular were the functional practice (authentic language use) strategies, which required a greater personal investment in the target culture and demanded more extracurricular effort in finding naturalistic practice situations. These results were attributed to what appeared to be a purely instrumental motivation for language learning, reflected in the overriding goals of most students in the sample: to fulfill the academic language requirement and to earn good grades in a relatively traditional academic environment that stressed (at least on tests) analytical rule-learning skills. Developing communicative competence did not seem to be a personal goal of most of the students; this might also have been the case with McGroarty's (1987) sample, mentioned above.

Two other related studies provide insights about the effects of motivational orientation on learning strategies, although motivational orientation was only indirectly observed in those studies. Ehrman and Oxford (1988, 1989) and Oxford (1986) found more frequent use of functional practice (authentic language use) strategies among two sets of adult language learners who were learning foreign languages for career reasons. These learners appeared instrumentally motivated to learn a new language, rather than integratively motivated to identify with people of the target culture. Nonetheless, their instrumental motivation led them to use communication-oriented strategies, in contrast to the instrumental motivation toward grades demonstrated by the university students in the

Nyikos and Oxford (forthcoming) study.

Politzer (undated) studied the language learning strategies of Asian and Hispanic graduate students learning English. He found that they were instrumentally rather than integratively motivated to learn the language, that instrumental motivation accounted for course gains, but that little evidence existed for a link between strategies used and motivational orientation (instrumental versus integrative). However, in a different study, Politzer and McGroarty (1985) stressed the importance of language learning goals in determining strategy use; a given strategy might be viewed as differentially appropriate for various language goals. As an example, Politzer and McGroarty stated that the strategy of asking a teacher how an expression is used might be associated with the goal of developing aural/oral communication skills but might not be seen as relevant for a student whose language learning goal is to develop skill in reading technical literature.

Personality characteristics. Some personality characteristics are long-term *traits*; others are more situational *states* invoked by the demands and pressures of given language learning circumstances. The relationship between personality characteristics, either long-term or situational, and language learning strategy choice has not been fully or systematically investigated.

Lack of inhibition has often been named as a characteristic of good language learners. As indicated earlier, Rubin (1975) suggested that "good" language learners are uninhibited and willing to risk appearing foolish or to make mistakes in order to communicate and learn. See Oxford (1990) for a demonstration of how these personality features can be encouraged through the use of affective strategies, such as self-encouragement. In examining the language learning strategies of successful university-level foreign language learners, Reiss (1985) found that these learners were not as uninhibited as anticipated, and that they paid more attention to form than to meaning. Nevertheless, they did employ helpful language learning strategies, such as using guessing and taking advantage of practice opportunities. The characteristic of inhibition might have been situational, related to the academic university environment.

Bailey (1983) used learner diaries to examine the personality features of anxiety and competitiveness, which often appeared

related. Although Bailey was not looking directly at language learning strategies, her evidence suggests that these characteristics were reflected in language-learning behaviors. Some learners tried harder and performed better under competitiveness and anxiety, but other learners faltered under the same pressure.

Career orientation. The definition of career orientation depends upon the age and status of the subjects. It might be defined as field of specialization (usually university major) or as current career position. Several studies have shown that career orientation relates to choice of language learning strategies. Politzer and McGroarty (1985) found that field of specialization (engineering/science versus social science/humanities) was associated with strategy choice of ESL students. Engineers avoided language learning strategies that are usually viewed as positive. These researchers also noted an overlap with national origin; many of the engineers in their sample were Asian.

In a study of foreign language learners, Oxford and Nyikos (1989) discovered that students' university major influenced strategy use. Humanities, social science, and education majors used two different categories of strategies (independent strategies and functional practice [language use] strategies) more often than did students majoring in other areas.

Ehrman and Oxford (1989) and Oxford and Ehrman (1989) found that current career position influenced foreign language learning strategy choice. Professional linguists used a wider variety of strategies than did adult language learners and the native-speaking language teachers not trained in linguistics. Specifically, professional linguists used more of the following general categories of strategies: functional practice (authentic language use), searching for and communicating meaning, formal model-building, and affective strategies. Reid (1987) found that ESL students' fields of specialization were related to learning modality preferences (visual, auditory, kinesthetic, tactile) which, as already mentioned, are probably related to choice of language learning strategies.

Even though statistical evidence of causality or influence appeared in some of these studies, variables other than career (e.g., self-selection of certain kinds of people into different career tracks, career training, and previous educational experience) probably played an

important role in strategy choice. It is important to keep in mind these and other intervening variables.

National origin. Numerous studies have shown that national origin or ethnicity has a strong association with the kinds of strategies used by language learners. For instance, Asian students seemed in some studies to prefer strategies involving rote memorization and language rules (Politzer, undated; Politzer & McGroarty, 1985; Tyacke & Mendelsohn, 1986) as opposed to more communicative strategies. Asians, as compared to Hispanics, responded less positively to strategy training (Russo & Stewner-Manzanares, 1985; O'Malley, Chamot, Stewner-Manzanares, Russo, & Kupper, 1985). Sutter (1987) found it necessary to camouflage the new strategies (especially those related to national origin) under the guise of old, familiar ones.

Differences in learning strategy use by national origin caused Politzer and McGroarty (1985) to ask whether our conceptions of good language learning strategies might be ethnocentrically biased. The answer might lie in what we perceive as the goal of language learning, discussed earlier. If language learning is for the purpose of social communication, certain types of strategies are seen as helpful, and if language learning is for other purposes, other strategies are labeled appropriate.

Language teaching methods. Language teaching methods, and unspoken expectations in the instructional environment, often influence language learning strategy use. Sutter (1987) stated that the longer students remained in a language program, the more they tended to prefer the language learning strategies subtly suggested by that program's instructional methods. Politzer (1983) noted a complex interaction between language teaching methods and learning behaviors (strategies) for university students of French, Spanish, and German. In another university setting, students' language learning strategies mirrored analytical, rule-based language instructional methods used in the university (Nyikos & Oxford, forthcoming; Oxford & Nyikos, 1989).

In contrast to the learning strategies revealed by the university studies, Ehrman and Oxford (1989) and Oxford and Ehrman (1989) found greater use of communication-oriented strategies by adults who were learning languages for professional reasons and whose

teachers used more communicative instructional methods. Leaver (forthcoming) speculated that the methods by which language skills were developed, formal analytic classroom work versus naturalistic acquisition, influenced students' preferred language learning strategies. As noted earlier, cooperative instructional methods have been shown to facilitate cooperative and communicative learner behaviors and to improve attitudes toward language learning (Bejarano, 1987; Gunderson & Johnson, 1980; Jacob & Mattson, 1987). However, even when communicative language teaching practices are used in the classroom, language learners sometimes ignore those practices and continue to use traditional, analytic language learning strategies (McGroarty, 1987); see previous discussion.

Although language teaching methods frequently affect use of language learning strategies, most language teachers are not aware of their students' learning strategies, or how these strategies result in particular kinds of errors (Cohen & Robbins, 1976; Cohen, Glasman, Rosenbaum-Cohen, Ferrara, & Fine, 1979; Hosenfeld, 1976; Hosenfeld, 1977a; O'Malley, Chamot, Stewner-Manzanares, Kupper, & Russo, 1985; Chamot, O'Malley, Kupper, & Impink-Hernandez, 1987). Because teaching methods often influence how students learn, teachers should become more aware of their students' learning strategies in order to orient teaching methods more appropriately.

Task requirements. The immediate requirements of language tasks can influence the use of language learning strategies. Bialystok (1981) found that students responded to different task requirements with different strategies. Some strategies were useful only for certain kinds of tasks; for instance, monitoring one's own errors was more useful for writing tasks than for reading or speaking tasks. However, functional practice promoted language achievement on *all* language tasks. As noted earlier, McDonough and McNerney (reported by Tyacke & Mendelsohn, 1986) found that more advanced students keyed their strategy use to particular language task requirements more so than did less advanced students.

Summary of Strategy Research

- Successful language learners use a variety of language learning strategies to become more self-directed and improve their performance.

- According to some studies, cognitive strategies are used more often than metacognitive strategies. Social and affective strategies are reported far less often. Other kinds of strategies, such as memory and compensation strategies, have not often been studied in terms of their frequency compared to cognitive, metacognitive, social, and affective strategies.

- Choice of strategy is influenced by or associated with a number of factors: the language studied, the course level or learning level, the degree of strategy awareness, age, sex, attitudes, motivation, purpose and goal, personality characteristics, career, national origin, teaching and testing methods, and task requirements. Note that self-selection might play a key role as an intervening variable (e.g., as related to career or course level). Differences in the kind of language (e.g., Japanese versus French) are associated with different learning strategies.

- More advanced students often use more task-relevant strategies.

- Learners who are more aware of themselves as learners and of their skills use more appropriate strategies than do learners who are less aware.

- Older students often use different strategies than do younger students, but this result might be mediated by course level, motivation level, learning purpose, and other factors.

- According to the very few studies on sex differences in strategy use, females use significantly more strategies, and more often, than do males. These strategies are more social and

communicative.

- Learners who have more positive attitudes, stronger motivation, and more communicative purposes or goals use more strategies.

- Personality characteristics—such as competitiveness or strong emotionality—influence the kinds of strategies chosen.

- People in different career fields tend to use different kinds of language learning strategies.

- National origin (related to ethnicity and cultural factors) affects strategy choice; Asians opt for more rote memorization, and Hispanics choose more social strategies.

- Traditional teaching and testing methods, focusing on learning discrete-point grammar items, encourage the use of analytic, formal strategies, but more innovative teaching and testing methods encourage more communicative strategies.

- Requirements of specific tasks influence the use of certain types of strategies; for example, writing tasks encourage self-correction more than do other kinds of tasks.

Relationships Between Styles and Strategies

The relationship between language learning styles and strategies is complex and, until recently, almost completely unexplored. However, it is likely that a strong relationship exists between individual preferred styles and their choice of language learning strategies. One ongoing study (Ehrman & Oxford, 1988, 1989; Oxford & Ehrman, 1989) investigated this relationship by means of a measure of strategy choice, the Strategy Inventory for Language Learning (SILL) (Oxford, 1986), and a measure of psychological type, the MBTI (Myers, 1962; Myers & McCaulley, 1985), which, as mentioned earlier, is also used as a measure of learning style (Lawrence, 1984).

This study found statistically significant causal relationships

(determined through analysis of variance) between styles and strategies. In the quantitative part of the study, extraverts reported significantly greater use of affective strategies and visualization strategies than did introverts, but introverts reported significantly more frequent use of strategies involving searching for and communicating meaning. Compared with sensing people, intuitive people used significantly more strategies in four categories: affective, formal model-building, functional practice, and searching for and communicating meaning. Feeling-type people, as compared with thinkers, showed significantly greater use of general study strategies. Perceivers, defined as those who do not need to come to closure rapidly, used significantly more strategies for searching for and communicating meaning than did judgers, who require rapid closure; judgers showed significantly more use of general study strategies than did perceivers.

These results were explained by Ehrman and Oxford (1988, 1989) with reference to the following conceptions of style. Extraverts' stronger preference for visual strategies could be related to their orientation to the outer world of people and things, and their greater preference for affective strategies might reflect strong interest in or ability to deal with feelings. Introverts' focus on meaning seems to relate to their concern for the inner world of ideas. Intuitives' greater use of a wide range of strategies appears to embody the general interest of such people in drawing inferences, seeing the whole picture, and working with patterns rather than details. The reason for feelers' preference for general study strategies was less clear than judgers' preference for the same strategies; it seems that this preference reflects judgers' strong tendency to want to get tasks done and complete assignments on time. The inclination of perceivers to use meaning-related strategies might indicate their desire to hold off coming to closure until further meaningful information is available.

The qualitative side of the same study indicated that intuition was the salient factor in the use of formal model building strategies, that extraverts and feelers use considerably more social interaction behaviors than do introverts and thinkers, and that the greatest number of specific strategies was mentioned by sensing-type learners. Learners' preferred style was generally reflected in the learning

strategies they chose to use spontaneously, although some learners were able—through personal initiative or external suggestion—to develop new strategies that were not reflective of their natural style inclinations. Other potentially important linkages between styles and strategies are found in the qualitative report (Ehrman & Oxford, 1988).

Other aspects of style, such as field independence versus dependence, sensory modality preference, reflection versus impulsivity, and so on, have not been investigated to date in reference to their relation to learning strategy choice. Current research, such as the Language Skill Change Project (LSCP), conducted by the Defense Language Institute and the Army Research Institute (Englert, 1985), and a dissertation (Rossi-Le, 1988), might provide some information on strategy-style linkages. The LSCP is measuring both field independent-dependent style and analytic-global style, and the Rossi-Le study is assessing sensory modality preference; both investigations are also examining the choice of language learning strategies using the SILL (Oxford, 1986). It might be that the LSCP will also produce data on relationships among aptitude, strategies, and styles, although the analysis plan has not yet been completely determined.

Relationships Between Styles/Strategies and Aptitude

This section discusses the few studies relating styles or strategies to aptitude, all within the language learning arena.

Styles and Aptitude

Style might be viewed as a component of aptitude, or at least a major predictor of language learning success, although research has not explored this possibility sufficiently. It is impossible to make any firm statements regarding language learning style and aptitude, although interesting suggestions arise from the research. First, Bialystok and Fröhlich (1978) found a moderate association between field independence and language learning aptitude, the latter measured by the MLAT. The reason for this linkage might relate to the kind of instruments involved. Second, Parry (1984) found that subjects with a high aptitude for foreign languages (as shown by the MLAT) tended to be sharpeners, field independent, accurate in

responding, cognitively complex to a mild degree, and flexible in cognitive control. In the same study, Parry discovered that subjects with high intellectual ability in general, not just as related to language learning, were also those who were sharpeners, field independent, and accurate in responding.

Strategies and Aptitude

Relationships between strategies and aptitude have hardly been studied, because researchers have not adopted a conceptual framework linking these variables. Results of the very few studies relating strategies and aptitude are inconsistent. Bialystok (1981) considered aptitude in her investigation of high school language learners but found that it was not as influential as attitude in affecting the strategies chosen by students. Politzer (1983) seems to have found aptitude to be more important than did Bialystok. Politzer suggested that intelligence (i.e., general ability or aptitude) might relate to both strategy use and language achievement.

Leino (1982) analyzed foreign language learning strategies and found that individuals of high conceptual levels (and presumably high general aptitude or intelligence) were much more able to give descriptions of their strategies than individuals with low conceptual levels. In other words, smarter people might not only use strategies different from those of less intelligent people, but they might also be more perceptive in noticing their own strategies and more articulate in describing them. One of the most important sets of strategies, known as metacognitive strategies, involves noticing, evaluating, and improving one's own performance, so metacognitive strategy use by definition embodies "intelligent behavior."

Implications of Existing Style/Strategy Research for the Prediction of Learning Success

The previous section has shown that there is little research that directly links styles or strategies with language aptitude. The situation exists partly because aptitude testing has been conceptualized very narrowly, focusing mostly on prediction of cognitive aspects of language learning. Given this cognitive conceptualization of aptitude, it is understandable that researchers have not been motivated

to study the relationships between aptitude on the one hand, and noncognitive aspects of styles and strategies on the other. Another problem is that the predicted (language performance) measures used in efforts to develop language aptitude tests have not always been valid. Greater precision in language-related style and strategy research, as well as in the development of language aptitude tests, will depend crucially on better tests of language performance.

Alternatives in Terminology

At the symposium on language aptitude testing that gave birth to this volume, one of the small discussion groups rebelled against the term "language aptitude testing" because of its restrictively cognitive connotations. The group unanimously proclaimed the need to substitute a more encompassing, if inelegant, term, such as "assessing the predictors of language learning success." The group members felt that the latter term would allow greater balance and would more easily include a range of valuable predictors: cognitive, attitudinal, motivational, personality-related, and demographic variables (sex, age, experience, ethnicity), as well as learning styles and strategies.

It is important to note that language learning success is defined differently in different settings. For instance, a government agency that prepares diplomats for foreign service might require proficiency in all four language skills, whereas another government agency with a different mission might require proficiency only in the receptive skills of listening and reading. One university might want to produce students who can read the target language in order to pass a graduate school foreign language requirement, but another university might want to develop students who can use the language with facility in oral conversation, and still another university might train students to use all four skills. An elementary school *language experience* program, an *early immersion* program, a junior high *exploratory* language program, and a *junior-year abroad* university program—all could have somewhat different goals and hence different definitions of language learning success. (A language experience or exploratory program is a self-contained, short-term program, at the elementary or junior high level, that introduces or teaches about a foreign language and culture. In an early immersion

program, regular curriculum activities are conducted in a second language, beginning as early as kindergarten or first grade.) In general, communicative competence is the broad goal of an increasing number of programs today, as mentioned earlier in this paper, but exactly what this term means in specific contexts, and which elements of communicative competence are most heavily stressed, depends on the program.

Styles and Strategies as Possible Predictors of Success

Certain kinds of language learning styles seem to have more promise than others in terms of predicting ultimate proficiency or achievement in a given context, according to what little existing research (mainly with small samples) is available on the subject. For instance, field independence, sharpening, flexibility, reflection, lack of need for immediate closure, broad pattern-seeking, and general interpersonal sensitivity are style aspects that seem to predict success in language learning in particular situations. In some formal settings introversion might be more adaptive than extraversion, though future research might show extraversion to be more useful in informal settings. These aspects of style need to be more thoroughly researched in order to determine whether they might be helpful candidates for inclusion in a language aptitude test battery.

Likewise, certain types of language learning strategies appear to be useful for many learners, although the appropriateness of a given strategy naturally depends on the nature of the learner, the task, the purpose for learning, the context, and other factors. Some of the most useful strategies (i.e., those that seem to correlate with or lead to successful language performance) include such items as guessing, continuing to try to communicate even in adverse circumstances or when the language knowledge level is inadequate, finding opportunities to practice, focusing on both meaning and structure, and dealing directly with the emotional difficulties involved in language learning. These strategies, deemed profitable for many successful language learners in various situations, might be included in a strategy inventory or observation scale that could be used to assess language learning success.

Purposes for Predicting Language Learning Success

Considering styles and strategies as predictors of language learning success naturally leads one to ask about the purpose for this prediction. At least four purposes exist for predicting language learning success:

- selection into or out of current or future language programs;
- placement or streaming into different kinds of language programs;
- tailoring or individualizing a given program to meet the needs of learners;
- diagnosis or counseling of learners who have difficulties.

The role of styles and strategies varies with these different prediction purposes. For example, if selection is the primary purpose, then styles and strategies, along with other factors, might be used to qualify or disqualify people for entrance into a given language program. In that scenario, only those individuals would be selected for language training who have a certain profile of styles and strategies (and other variables).

If placement or streaming into various types of programs is the purpose for prediction—as in the programs of certain government language schools—then styles and strategies can be used as factors in determining the kind of program that best fits the strengths of a given individual.

Tailoring, individualizing, diagnosis, and counseling purposes are all related. The first two involve adapting the curriculum to the needs of the student; the last two entail helping the student to adapt himself or herself to develop specific learning skills and to overcome identifiable difficulties. For tailoring or individualizing, available information on individuals' styles and strategies can be used to help the teacher know the best ways to reshape the curriculum; for instance, learners who think analytically would be very uncomfortable in a totally oral program that focused on global learning, so the program would need to be adapted to meet personal needs of individuals. For diagnosis and counseling, results of style and strategy assessment can help teachers and learners identify the

sources of learning difficulties. In addition, this information can then suggest new strategies that could be tried—outside of the individual learner's "comfort zone." (Comfort zone strategies are strategies that fit most easily into the learner's preferred style.)

Changing Learners' Styles and Strategies

Another set of issues arises when one considers using styles and strategies as predictors of language learning success—the degree to which styles and strategies can be changed. How much do learners' styles naturally change with increased maturity, new settings, greater exposure to a variety of demands and experiences, and so on? Can or should one tamper with learners' existing style orientations?

Clearly it is easier to teach learners to use new behaviors or strategies than to change their fundamental preferences or styles, especially in a short period. Several strategy training issues are important and need to be addressed. For instance, to what extent can learners learn new strategies? What is the best way to teach new strategies? How far beyond a given learner's "comfort zone" should he or she be pushed, led, or encouraged in terms of new strategies? Should strategy training be completely explicit, as many researchers have found, or should new strategies be somehow camouflaged and left implicit, as some practitioners have found? These issues are beyond the scope of this chapter. See Oxford (1990) for discussions of these questions.

Reliability and Validity Issues

A predictive battery must be both reliable and valid. However, if language learning success is defined differently for various environments and for different language learning goals, and if prediction itself is used for contrasting purposes (selection, diagnosis, etc.), then reliability and validity quickly begin to seem like shimmering mirages. It may be that psychometric quality indices like reliability and validity need to be determined with reference to broad classes of settings, learning goals, and prediction purposes. Psychometricians need to take a new view of the issues involved in predicting language learning success, and they need to provide guidance on how to create reliable and valid batteries of predictors.

Implications for Further Research

This chapter has explored some important connections among styles, strategies, and aptitude. It has discussed the existing research, sparse though it might be with reference to aspects of these variables. Obviously much more research is needed on styles and strategies, especially because of the potential importance of these variables in predicting foreign language proficiency. Different dimensions of style need to be studied in relation to proficiency, and the linkage between styles and strategies needs to be pursued.

Within each of the research areas of styles and strategies, work must be done to organize and systematize the variables or dimensions. As noted at the beginning of this chapter, the many dimensions of styles and strategies currently represent a mosaic of constructs, some of which are to a degree independent of each other, others of which are overlapping or almost identical, and still others of which seem to be missing. Much organizing must be accomplished to make styles and strategies more coherent. In particular, strategies need to be arranged, if possible, in a more hierarchical taxonomy, to be validated by empirical research, and accepted by the scientific community. The modification of styles and strategies should be investigated further, along with costs and benefits for the classroom. The issue of matching students' and teachers' strategies and styles is still unresolved.

The role of mediating or intervening variables, such as self-selection, needs to be studied in relation to style and strategy research. For instance, at first glance, career orientation seems influential in learners' choice of strategies, and it is also associated with learning style. However, self-selection, previous training, family or societal expectations, and other factors might be intervening variables that relate to career orientation and are more basic than career orientation in explaining style or strategy results.

Specific style dimensions, such as field independence-dependence, leveling-sharpening, global-analytic tendencies, flexibility, reflection-impulsivity, and degree of need for closure, seem related to the quality of language performance. Particular learning strategies, such as certain kinds of practice, planning, and note-taking, are widely used, while other strategies, like self-evaluation and affec-

tive strategies for controlling emotions and attitudes, are rarely reported. Reasons for the frequency of use of various strategies have not been fully explained. All these style and strategy topics cry out for systematic exploration.

An equally serious research need is investigation of aptitude in its many facets: as a predictor of proficiency, and as a subsumer or correlate of strategies and styles. The whole concept of aptitude needs to be reexamined and broadened, possibly to include styles and strategies. A conceptual framework that includes not only styles and strategies, but also aptitude, needs to be developed and tested.

Measurement is a major issue for styles, strategies, and aptitude. Many research instruments are used without adequate proof of reliability and validity, or without any clear theoretical basis. It is not surprising, then, that major conflicts sometimes exist in the research results.

Despite these problems, it is important to continue pursuing research on language learning styles, strategies, and aptitude. Greater understanding of these phenomena will help improve language instruction and increase students' chances of becoming proficient.

Notes

1) Strategic competence as defined by Canale and Swain (1980) and Canale (1983) is sometimes viewed as competence in communication strategies or language use strategies. The debate about the differences or similarities among communication strategies, language use strategies, and language learning strategies will not be discussed here. This debate is an interminable and relatively meaningless squabble in terms of actual practice by language learners. See Wenden and Rubin (1987) and Oxford (1989) for various sides to the debate.
2) Some researchers make a distinction between *communicative competence* (fluency) and *linguistic competence* (accuracy), whereas the Canale and Swain model of communicative competence, and the whole proficiency movement, includes linguistic competence or accuracy as part of, not separate from, a broad communicative framework.

3) Groups that are less powerful or more dominated by others might show greater field dependence; this would seem to hold for females in most cultures. In addition, individuals from agricultural, subsistence-level, authoritarian societies are more field dependent, according to Shipman and Shipman (1985).

(Willing, 1988, warns that FI-FD measures might be culturally biased in favor of Western, especially Northern European, societies.)

4) See Note 2 for the distinction between linguistic competence and communicative competence.

5) Many studies outside the language learning field have demonstrated the strong utility of cooperative learning, as shown in reviews (Kohn, 1987; Dansereau, 1983, 1985). Cooperative learning consistently shows the following significant effects, according to researchers outside of the language area: higher self-esteem; greater confidence and enjoyment; higher and more rapid achievement; more respect for the teacher, the school, and the subject; use of higher-level cognitive strategies; decrease in prejudice and ridicule of people who are "different"; and increase in altruism and mutual concern.

Other results are as follows: First, cooperative learning succeeds best when students are not just grouped (without further guidance) but are also specifically trained to use certain learning strategies, such as making periodic summaries of the material, alternating roles, or questioning each other. Second, when students in a cooperative group are similar on various style dimensions, such as, analytic versus global or visual versus auditory, they learn more from each other than when they are different on these dimensions. However, learners with different ability levels seem to help each other more than learners who are perfectly matched for ability. Third, cooperative groups do not benefit from competing against other cooperative groups. Fourth, the optimal size of a cooperative group appears to be two or three, except for complex tasks, which may require up to six.

In the language classroom, encouragement of cooperative learning has been shown to be highly beneficial. Language learning researchers (Gunderson & Johnson, 1980; Sharan et al., 1985; Bejarano, 1987) have found that language students, like

students of other subjects, can be led to increase their cooperativeness when the teacher establishes a cooperative task or reward structure. Some statistically significant results of these cooperative learning structures (when compared to whole-class learning designs) include a decrease in prejudiced attitudes among ethnic groups, more student interaction, and higher language achievement scores (Sharan et al., 1985; Bejarano, 1987), as well as more favorable teacher and student attitudes toward the language class situation (Gunderson & Johnson, 1980). Cooperative learning increases language learning motivation, communicative practice opportunities, feedback about language errors, and use of varied language functions (Jacob & Mattson, 1987; Wong Fillmore, 1985; Gales, 1985; Seliger, 1983).

6) Certain parts of the discussion of factors affecting strategy choice are drawn from an article in *System* (Oxford, 1989).

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4

The Role of Personality Type in Adult Language Learning: An Ongoing Investigation

Madeline Ehrman

Introduction

This chapter describes an ongoing project to examine the role of learning styles in adult second language acquisition in an intensive language training setting. The model of learning styles used is Carl Jung's typology of conscious functioning (1971); the model is operationally defined by a psychological instrument, the Myers-Briggs Type Indicator (MBTI). Through the MBTI, this learning styles model is also being used at the Foreign Service Institute (FSI) as a base for student counseling and for team building among teachers. Preliminary quantitative and qualitative results are outlined in the body of this paper and reported in greater detail elsewhere (Ehrman & Oxford, 1989; Oxford & Ehrman, 1989; Oxford, Nyikos, & Ehrman, 1988).

Because the MBTI is proving very useful for these purposes, we have also wondered about the utility of the model and the instrument for prediction of success in language learning. Thus, in addition to describing the project, this paper also takes a look at the potential contribution of personality type to the discussion of language aptitude and its measurement.

Thoughts on Language Aptitude

What is Language Aptitude?

It has long been assumed in the language training field that some people have more of a language learning aptitude than others. What has become increasingly clear, however, is the wide variation in the circumstances under which language learning can take place. These observations raise new questions about aptitude.

What is meant by language aptitude? Generally, the term is used to refer to the ability to learn foreign languages quickly and without extreme expenditure of effort. Probably most would agree that a "good" learner usually has a high language aptitude. One might cynically say, though, that a "good" language learner is one who needs little teaching, because the term is applied to those who catch on and remember right away in a classroom, or to those who can gain a level (usually undetermined) of communicative competence in direct interaction with native speakers.

It might be more appropriate to call these people *linguistic virtuosos* and confine this discussion to people more like the usual run of students who populate language classrooms. In this case, the term aptitude is likely to refer to an ability to benefit from good teaching and a well-designed curriculum. One might then say that "bad" learners are those who do not profit from the teacher's efforts and that they lack aptitude. (One might equally say that they are learners whose needs we do not yet know how to meet; and in fact, this is a more optimistic view of adult language learning capacity.)

In either case, aptitude may be defined as the ability to profit from what a training program or teacher has to offer. It is tempting to suspect that aptitude viewed in this light is a shorthand for the fortunate harmony of training offerings and individual approach to learning that brings quick, relatively painless results. It is this view of aptitude that makes consideration of individual learning styles relevant, because such a favorable compatibility cannot always be expected.

Why Do We Need To Know a Person's Aptitude?

Language aptitude becomes important for job placement. In government agencies, for example, assignment personnel would

like to reduce the risk that employees will not be able to make use of expensive training; training program administrators want their programs to be cost-effective; and teachers like successful outcomes. Government agencies also look for an accurate prediction of results and an appropriate estimate of the duration of a language training course. Aptitude is also used to place students and target their training. For instance, if a teacher can group together students who have trouble with the existing methodology, not only is competitive stress reduced, but the teacher can choose more appropriately among curriculum alternatives. In addition, the teacher can individualize more precisely within a heterogenous group.

In language training, the question arises as to what level and kind of proficiency can be reached. This is a matter of setting clear goals for training. If the goal is to produce reasonable facsimiles of native speakers in a year, only the virtuosos will be of interest. At the other extreme, the goal may only be to enable students to feel at home in an overseas culture and meet the most basic survival needs, with only rudimentary proficiency. Most students with normal neural physiology can do this. The goal of most language training falls somewhere between the two extremes.

The language student and the teacher must answer the question of what is the purpose of learning the language. If the student wants to be able to read Russian literature, but never expects to exchange a word with a Soviet citizen, the skills needed for language study may be different from those needed by a Peace Corps volunteer who plans to work with chicken farmers in a rural village. Not all the same aptitude factors need apply in both cases.

The settings for language training differ a great deal. The primary settings include non-intensive classrooms, as in most schools and universities; intensive classrooms, as in the government language schools; and interaction for real purposes in the target culture. Although some of these settings may be conducive to success for more students than others, most people have little choice and take their training wherever possible. Some fortunate individuals can learn in all of these settings; most people achieve best in one or more of them, and a few people have difficulty in all.

Methodologies vary widely. Some require little or no oral production (e.g., grammar-translation). Others are aimed primarily at

oral fluency, for example, the audio-lingual method. Audio-lingual methods are at one end of a continuum of teacher-centered regimentation; counseling learning, which is very much learner-centered, is near the other end. Affective considerations drive some approaches far more than others; some are characterized by more induction than many students are used to. Many teachers will make use of several approaches during a training program. The welcome reduction within language teaching circles of discussion of the "best" methodology suggests that we have come to realize that in language teaching "one size does *not* fit all."

Within any one of the training environments mentioned above, there are a multitude of other variables besides setting that make a difference to learners. This chapter focuses on the intensive government language classroom setting. In this setting alone, there are variables of class size, physical surroundings, teacher personality, student occupation, student personality, nature of the target culture, etc. Any or all of the variables are likely to affect individuals differently.

Within the intensive language learning classroom, it is not completely clear whether the ability to reach a level of language proficiency useful in diplomatic settings is, in fact, a general aptitude factor. It seems more likely that aptitude is a product of differences in *cognitive style* (Tyler, 1980) and affective personality traits (Stevick, 1980) that interact with such external variables as setting and methodology. (Specific cognitive abilities, some of which are measured by instruments like the Modern Language Aptitude Test (MLAT), are probably also involved.) One student may find that specific teaching approaches are either too rigid or too disorganized; other students may have unusual difficulty when there is friction in a classroom; still others are energized by competition and less sensitive to interpersonal undercurrents.

What is the Role of Internal Variables?

The presence and role of a general aptitude factor are difficult to sort out unambiguously from other internal variables. As part of such an effort, however, the project described in this paper focuses on internal variables under the rubric *learning styles*. This term is often used to refer to both cognitive style and other, largely affective,

internal variables that differentiate individuals from each other in their approach to learning.

Learning styles are information-processing preferences that affect the focus of attention of individual learners, the choice of learning activities to which students will gravitate, and the kinds of experience that will enhance motivation, or increase anxiety. Here *preferences* are defined as the tendency to gravitate toward a given type of processing whenever circumstances permit. Preferences are not absolute; they represent probable, not perfectly predictable, behavior. However, they tend to be sufficiently ingrained that they can often be seen as clear personality characteristics.

A variety of models of learning style are in use now, among them Bernice McCarthy's 4MAT model (1980), based largely on the work of David Kolb (1984), the Dunn & Dunn model (Keefe, 1979), and others that are well described in the two volumes on learning styles edited by Keefe (1979, 1982). A great deal of work has been done in the field of learning with Witkin's "psychological differentiation," *field dependence-independence* (Witkin & Goodenough, 1981); in the field of language learning in particular, the findings about the utility of psychological differentiation are mixed. The 4MAT model (McCarthy, 1980) offers a base for curriculum development that will reach a variety of learning approaches and has been tried in this capacity in one of the FSI language programs. It does not appear to be as applicable to some of the other elements of learning, particularly the interpersonal and affective dimensions, however. Leaver (1988) describes promising work with brain hemisphericity, based on work with FSI Russian students. Other models seem to offer less broad applicability.

Language learning strategies are closely related to learning aptitude issues. These, along with studies of learning styles, are treated in detail by Rebecca Oxford (this volume) in her review of research on this subject. The interaction of learning style and preferred learning strategies also bears heavily on the question of success in language learning (Ehrman & Oxford, 1988, 1989; Oxford & Ehrman, 1989).

Language Aptitude and the MBTI

Although it has limitations, the MBTI and its underlying model

seem to apply to a wider range of the phenomena that affect classroom language learning than do most of the other learning style approaches. The MBTI has considerable applicability to cognitive learning styles, and it offers dimensions that address the interpersonal and affective directly, as well as dimensions that address the general approach to task accomplishment. All of these play important roles in the successful learning of foreign languages. Furthermore, MBTI theory is developmental, not static, so it can be applied to people at a variety of ages and stages in their lives. Above all, though MBTI theory is rich and complicated, its essentials are easy to understand in a short interpretation session after completing the questionnaire. It is affirming for people of all types, so defensiveness is minimal.[1]

A common question is the following: What MBTI type is the best language learner? Language learners of a wide variety of psychological types are successful in FSI classrooms. Discussing which psychological type makes the most successful language learner is less helpful than looking for specific clues about why individuals do or do not succeed. Some of the information comes from quantitative work, but more has come from interview material and the experience of using type as a base for student counseling.

Then, one might ask, how do personality type and aptitude testing relate? The answer to this question lies in knowledge of personality type. This knowledge can contribute to refining selection and placement criteria, and can also be useful in helping learners make the most of their assets. For example, in a case where it is possible to select learners for participation in language training, type-based information on likelihood of success in a given setting would be useful.

Continued research on the applicability of type factors to language learning may yield information that will help with placement of individual students in compatible programs. It may also contribute to explanation of the failure of individuals in specific programs.

BACKGROUND

The subject of the relationship between psychological type and language learning success may be clearer after a description of the

MBTI model and how it applies to language learning at FSI.

Description of the Setting

FSI's School of Language Studies (SLS) offers full-time intensive training to government employees and adult members of their families in roughly 40 languages. It is organized into three instructional departments, one for Romance languages, one for Germanic and Slavic languages, and one that is the "department of everything else," the Department of Asian and African Languages. Each instructional department is headed by a chairman, under whom work 6-8 language training supervisors (LTS). The LTSs are advanced degree holders in applied linguistics and related subjects. Each of the language training supervisors heads a team of 10-15 language and culture instructors, who are native speakers of the languages they teach.

The project described in this paper began in the Department of Asian and African Languages. The department consists of roughly 60 native-speaker instructors representing roughly 22 languages, 8 language training supervisors (including the department chair), and at peak enrollment, well over 200 students, most of whom are in intensive language training for 24 to 44 weeks.

Methodologies used range from modified audio-lingual to the almost exclusively communicative, depending on the choice and style of each language section. The majority of the students studied were in Turkish training, which uses a grammar-based textbook as the sequencing mechanism for an otherwise heavily communicative program. There is a great deal of emphasis on receptive skills using authentic material and on work-related linguistic production.

Using the MBTI

Described here is the experience of using the MBTI in two areas. First, there is research to investigate the relationship of psychological type variables to adult foreign language learning. Components of this research include the following:

- data gathering by interview of students and teachers, with some early useful results;
- an empirical study investigating the relationship between

type variables and the self-report of use of specific language learning strategies.

Second, there is the introduction of the MBTI to the institutional framework of the School of Language Studies (SLS). In this organizational context, the MBTI is used for many purposes:

- to serve as a base for team building among language instructors and language training supervisors;
- to sensitize teachers and students to variations in language learning style;
- to provide a tool for more effective student counseling by teachers and training supervisors;
- to bring about a shared vocabulary to contribute to enhanced communication among the members of the large and fragmented SLS.

All of these efforts have potential to clarify factors of language learning ability.

Brief History of the Project

The theory[2] on which the MBTI was based appeared to have potential to account for much of the cognitive and affective behavior observed regularly in our classrooms. Exploration of the MBTI theory led to a proposal for a low-budget project to investigate the utility of the MBTI for SLS; the proposal was approved and investigations began in August 1986.

The agenda for the project included investigating learning styles; enhancing understanding among teachers and between teachers and students; providing a shared vocabulary to improve communication in the several groups in the department (supervisors, teachers, students, within and across language groups); and offering a vehicle for personal growth by staff and students. Only the first of these goals was explicitly stated at first, because of the negative reflex many Foreign Service Officers have to psychological instruments and to anything they interpret as "touchy-feely."

Instructors and students of Japanese, Thai, and Turkish were invited to participate. Results with the first group were sufficiently

promising that teachers and students in Indonesian, Burmese, and Korean joined the project; teachers of Malay, Tagalog, Sinhala, Hebrew, Lao, Dari, Swahili, Vietnamese, and Amharic also took the MBTI, and some of their students participated. The attached type tables show the distributions of staff and students who participated in the quantitative pilot study.

Description of the Project

The project had three interlocking parts:

Staff development. Teachers and training supervisors took the MBTI, received a two-to-three-hour group interpretation of the results, and participated in a workshop relating type to learning and teaching. Psychological type was part of the basis for continuing discussions between teachers and training supervisors, of student and classroom issues. Type was also regularly referred to in discussions between the training supervisors and the project director.

Student assistance. Students took the MBTI, received a two-to-three-hour group interpretation of its results, and participated in a workshop relating type to language learning. Type concepts were also used in individual academic counseling as appropriate. Students were encouraged to make use of their knowledge of individual differences in style to enhance their interrelations in class.

Research component. There were two thrusts to the research portion of this project:

a) Quantitative research is based on analysis of the interaction of the MBTI with other formal, discrete measures. The first product was a pilot study relating the MBTI types to student self-report on the Strategy Inventory for Language Learning (SILL) (Oxford, 1986), which treats preferred language learning techniques. Plans for the future include a replication of this study with a much larger sample and continuing integration of quantitative results with the qualitative ones. Further work suggested by pilot study results also includes an attempt to look for a statistical relation between MBTI type, end-of-training results, and such aptitude measures as the Modern Language Aptitude Test (MLAT).

b) Qualitative work is based on anecdotes, student and teacher

feedback, discussions at the end of training and when counseling students, and teacher discussions of student progress. Notes were kept as all such information was received. Ehrman & Oxford (1989a) describe a recently conducted qualitative analysis of the interview data collected.

Method

The primary question of this study was whether the Jungian psychological type model provides useful information about adult language learning. To this end, the study examined certain factors: (1) personality type as a measure of cognitive and affective style; (2) preferred language learning strategies; (3) selected personal variables; and (4) outcome ratings. This was not a study of the effects of a given set of treatments; there was no effort to measure outcomes rigorously, because outcomes were incidental to investigating the above-listed factors.

The specific hypotheses that served as the basis for both quantitative and qualitative studies represented predictions made on the basis of type theory and initial observations of language learning behavior. Because these results are reported in greater detail in other papers (Ehrman & Oxford, 1989; Oxford & Ehrman, 1989), here they are summarized with each hypothesis.

1. There are patterns in language learning strategies associated with type preference scales. This is supported in both studies.
2. The combinations of perception (Intuition or Sensation) and judgment (Thinking or Feeling) correlate with better success in language learning (as indicated by faculty performance ratings). This result is supported weakly in the qualitative study; it was not investigated in the quantitative study.
3. Combinations of perception and judgment will correlate with greater use of specific language learning strategies. This is supported in the qualitative study; there is weak evidence in the quantitative study.

For the quantitative study, there were seven hypotheses related

to sex and occupation differences and to specific SILL variables:

1. Females will report greater strategy use than males. This hypothesis was supported.
2. Professional language trainers use a wider variety of strategies than others in the sample. This was strongly supported.
3. Extraverts are more likely than Introverts to employ affective strategies, authentic language use, and social strategies; they are less likely to use independent strategies and self-management techniques. This hypothesis is partially supported for Extraverts for affective strategies.
4. Sensing types use mnemonics and visualization strategies more often than do Intuitors, and Intuitors search for and communicate meaning and employ formal model building more frequently than do Sensing types. Hypotheses for Intuitors were supported; no correlations emerged for Sensing types.
5. Thinkers use formal model building more frequently, while Feelers employ authentic language use, searching for and communicating meaning, social strategies, and affective strategies. This hypothesis was not supported.
6. Judgers use general strategies, independent strategies, and self-management, while Perceivers employ strategies concerned with searching for and communicating meaning. This was supported for Perceivers, as hypothesized, and for Judgers for general learning strategies only.
7. Intuitive Feelers use the widest variety of learning strategies, while Intuitive Thinkers prefer formal model building strategies. This was not supported.

Sample

There were 78 subjects in the quantitative study. Of these, 30 were FSI students (Foreign Service Officers, military officers, and spouses) studying Japanese, Korean, Thai, and Turkish; 26 were FSI language instructors (native speakers of Japanese, Thai, Turkish, Indonesian, Italian, and Hungarian); 22 were professional language trainers with graduate degrees in theoretical or applied linguistics or with equivalent experience.

Although the teachers were not native speakers of English, all had lived in the United States for a number of years and were proficient at reading and understanding English. Most of the teachers did not come to FSI as professional language teachers; they began teaching their native language simply to make a living and have since adopted teaching as a profession.

The students included U. S. Government employees and spouses from the Departments of State and Defense and the United States Information Agency. All students were college graduates; a number held advanced liberal arts degrees. Most had studied French or Spanish in high school or college; a few entered training with previous study at FSI or with a background in non-Indo-European languages. This sample was not controlled for previous language learning experience, age, or aptitude.

The professional language trainers were members of the supervisory and management staff of the FSI School of Language Studies and of the technical staff of the Center for Applied Linguistics (CAL). Four were university professors of linguistics and related subjects.

Type Tables I-IV show the MBTI type distributions of the quantitative research sample.

The sample used in the quantitative research provided all the subjects for the qualitative research. In the quantitative research sample, 19 of the 30 FSI students were interviewed at various periods in their FSI language training program. These 19 became the qualitative subsample. Their teachers and relevant training supervisors were also interviewed to provide corroboration.

The interviewer directly supervised the training of the 17 students of Turkish included in the qualitative subsample. The interviewer was second-line supervisor for the other two individuals, who were students of Japanese and Korean. The Turkish students were interviewed as part of the routine progress report and end-of-training debriefings. The Japanese student was interviewed both because he had performed extraordinarily well and because he added another psychological type that was not represented among the Turkish students. The Korean student had previous experience with the MBTI and asked to consult with the interviewer about the applicability of the model to his study; his interview therefore represented the substance of a lengthy conversation.

TABLE I: Type Tables from the Quantitative Study

Type Distribution: All Participants N = 79

					N	%
ISTJ	ISFJ	INFJ	INTJ	E	39	49
N=6	N=4	N=3	N=6	I	40	51
(8%)	(5%)	(4%)	(8%)			
				S	34	43
*****	****	***	*****	N	45	57
*			*			
				T	47	59
				F	33	41
ISTP	ISFP	INFP	INTP	J	42	53
N=4	N=1	N=6	N=10	P	37	47
(5%)	(1%)	(8%)	(12%)			
				IJ	19	24
****	*	*****	*****	IP	21	26
		*	*****	EP	16	20
				EJ	23	29
				ST	20	25
				SF	14	17
ESTP	ESFP	ENFP	ENTP	NF	18	23
N=3	N=3	N=6	N=4	NT	27	34
(4%)	(4%)	(8%)	(5%)			
				SJ	23	29
***	***	*****	****	SP	11	13
		*		NP	26	33
				NJ	19	24
ESTJ	ESFJ	ENFJ	ENTJ	TJ	26	33
N=7	N=6	N=3	N=7	TP	21	26
(9%)	(8%)	(4%)	(9%)	FP	16	20
				FJ	16	20
*****	*****	***	*****			
**	*		**	IN	25	32
				EN	20	25
				IS	15	18
				ES	19	24

* = one person.

Percents do not add up to precisely 100 because of rounding.

TABLE II

Type Distribution: Students N = 30

ISTJ	ISFJ	INFJ	INTJ
N=4	N=2	N=0	N=3
(13%)	(7%)	(0%)	(10%)
****	**		***

ISTP	ISFP	INFP	INTP
N=2	N=0	N=2	N=3
(7%)	(0%)	(7%)	(10%)
**		**	***

ESTP	ESFP	ENFP	ENTP
N=0	N=1	N=4	N=1
(0%)	(3%)	(13%)	(3%)
	*	****	*

ESTJ	ESFJ	ENFJ	ENTJ
N=3	N=1	N=0	N=4
(10%)	(3%)	(0%)	(13%)
***	*		****

	N	%
E	14	47
I	16	53
S	13	43
N	17	57
T	20	67
F	10	33
J	17	57
P	13	43
IJ	9	30
IP	7	23
EP	6	20
EJ	8	27
ST	9	30
SF	4	13
NF	6	20
NT	11	37
SJ	10	33
SP	3	10
NP	10	33
NJ	7	23
TJ	14	47
TP	6	20
FP	7	23
FJ	3	10
IN	8	27
EN	9	30
IS	8	27
ES	5	16

* = one person.

Percents do not add up to precisely 100 because of rounding.

TABLE III

Type Distribution: Language Teachers N = 26

					N	%
ISTJ	ISFJ	INFJ	INTJ	E	17	65
N=1	N=2	N=0	N=0	I	9	35
(4%)	(8%)	(0%)	(0%)			
				S	20	77
*	**			N	6	23
				T	12	46
				F	14	54
ISTP	ISFP	INFP	INTP	J	13	50
N=2	N=1	N=2	N=1	P	13	50
(8%)	(4%)	(8%)	(4%)			
				IJ	3	12
**	*	**	*	IP	6	23
				EP	7	27
				EJ	10	38
				ST	10	38
				SF	10	38
ESTP	ESFP	ENFP	ENTP	NF	4	16
N=3	N=2	N=1	N=1	NT	2	8
(11%)	(8%)	(4%)	(4%)			
				SJ	12	46
***	**	*	*	SP	8	31
				NP	5	19
				NJ	1	4
				TJ	5	19
				TP	7	27
ESTJ	ESFJ	ENFJ	ENTJ	FP	6	23
N=4	N=5	N=1	N=0	FJ	8	31
(15%)	(18%)	(4%)	(0%)			
				IN	3	12
****	*****	*		EN	3	12
				IS	6	23
				ES	14	53

* = one person.

TABLE IV

Type Distribution: Professional Language Trainers N = 22

					N	%
ISTJ	ISFJ	INFJ	INTJ	E	7	32
N=1	N=0	N=3	N=3	I	15	68
(5%)	(0%)	(13%)	(13%)			
				S	1	5
*		***	***	N	21	95
				T	15	68
				F	7	32
ISTP	ISFP	INFP	INTP	J	11	50
N=0	N=0	N=2	N=6	P	11	50
(0%)	(0%)	(9%)	(27%)			
				IJ	7	32
		**	*****	IP	8	36
			*	EP	3	14
				EJ	4	18
				ST	1	5
				SF	0	0
ESTP	ESFP	ENFP	ENTP	NF	7	32
N=0	N=0	N=1	N=2	NT	14	63
(0%)	(0%)	(5%)	(9%)			
				SJ	1	5
		*	**	SP	0	0
				NP	11	50
				NJ	10	45
				TJ	7	32
				TP	8	36
ESTJ	ESFJ	ENFJ	ENTJ	FP	3	14
N=0	N=0	N=1	N=3	FJ	4	18
(0%)	(0%)	(5%)	(13%)			
				IN	14	63
		*	***	EN	7	32
				IS	1	5
				ES	0	0

* = one person.

TABLE V - Description of the 19-person Qualitative Subsample

Pseudonym	Sex	Agency/ Occupation	Type	Age	Weeks/ Training
Peter Byrd	M	USIA FSO	INFP	25	24
Edith Condor	F	State FSO	ENTJ	46	44
Terence Crabbe	M	State FSO	ISTJ	44	44
Katherine Doggett	F	State FSO	ESFJ	40	44
Scott Doggett	M	State FSO	ESTJ	41	44
James Emmett	M	State Security Officer	ESTJ	35	24
Theodore Foxe	M	State FSO	INTJ	31	44
Melissa Hart	F	USIA FSO	ENFJ	30	24
Simon Hopper	M	State FSO	ESFP	36	44
Jeff Leverett	M	State FSO	ISTJ	41	44
Fred Lynx	M	State FSO	INTP	43	44
Bert Lyons	M	State FSO	INTP	30	24
Elaine Marten	F	State FSO	ENTJ	36	41
Colin Otter	M	State FSO	INTJ	30	24
Dennis Pike	M	State FSO (Japanese)	ISTP	37	44
Richard Pollock	M	USIA FSO (Korean)	INFP	45	20
Nora Wolfe	F	State FSO	ENTJ	52	44
Charles Wrenn	M	DOD Military Officer	ESTJ	46	44
Edna Wrenn	F	Housewife	ISFJ	45	42

Note: USIA = U.S. Information Agency
State = Department of State
DOD = Department of Defense
FSO = Foreign Service Officer
E = Extraversion, I = Introversion
S = Sensing, N = Intuition
T = Thinking, F = Feeling
J = Judging, P = Perceiving

All students were learning Turkish unless otherwise noted.

TABLE VI - Type Table of Interviewed Students

ISTJ	ISFJ	INFJ	INTJ
Jeff	Edna		Colin
Terence			Theodore
ISTP	**ISFP**	**INFP**	**INTP**
Dennis		Peter	Bert
		Richard	Fred
ESTP	**ESFP**	**ENFP**	**ENTP**
	Simon		
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
Charles	Katherine	Melissa	Edith
James			Elaine
Scott			Nora

This 19-person qualitative subsample may be considered representative of typical FSI students in terms of language training duration, occupational background, age range, and personality type range. Table V introduces each member of the subsample; all names are fictitious. The categories used in Table IV are pseudonym, sex, agency and occupation, MBTI type, age, and weeks of training received. All participants were students of Turkish except as otherwise indicated.

The qualitative sample controlled for previous language learning (Western European languages or no previous languages) and subjects' native language (English). It accounted for age, sex, and occupation. Because 17 of the 19 members of the qualitative sample were studying the same language, Turkish, and the other two members were learning a distantly related language (Japanese or Korean), the factor of difficulty of the target language for English speakers was taken into account.

Table VI shows the 19 qualitative subsample members in standard "type table" array.

The subjects were adults; nearly all had previous language study. Lack of such previous study was a considerable hindrance to the few who did not have it; a likely remediation for such students is direct training in language learning strategies, which is not yet done in a systematic way at FSI.

It is worth noting that the student and language training professional subsets were preselected for whatever factors are measured by the MLAT. In order to enter the program, students in so-called "hard" languages were subject to an MLAT cutoff score of 60 (scaled score), which is at about the mean for the State Department population (there were a few exceptions who were admitted with scores below the cutoff). Training professionals in general were good language learners, and those who had taken the MLAT had high scores.[3]

Instrumentation[4]. This project used two paper and pencil instruments for the quantitative study: the MBTI for personality type, and the Strategy Inventory for Language Learning (SILL) (Oxford, 1986) for language learning strategies and techniques. The present paper does not directly address the results of the latter; descriptive material about the SILL and a list of the factors appear in Appendix A.

The MBTI was originally developed by Katherine Briggs and Isabel Myers as a research instrument (Myers, 1962). It was published for general use by the Consulting Psychologists Press in 1975. This study uses the 1977 Form G, a 126-item, forced choice normative, self-report questionnaire (Hicks, 1970), which is designed to reveal basic personality preferences in four dimensions. Based on the work of Carl Jung (1971), it is built on the theory that behavior in daily life is a manifestation of underlying stable and unchanging preferences for certain ways of functioning. Jung's theory posited that each individual will have a preference for one of the first three preference pairs listed below; Myers and Briggs added the fourth as an indirect way to follow up on the concept of dominant and auxiliary function that Jung introduced but did not elaborate (Jung, 1971, p. 405; Myers & McCaulley, 1985, p. 13).

Internal consistency reliability studies, which use product-moment correlations of split-half scores with Spearman-Brown prophecy formula correction, average .87, based on a 9,182-person adult college-graduate sample from the Data Bank of the Center for Applications of Psychological Type (Myers & McCaulley, 1985, p. 166). Test-retest, product-moment correlation reliabilities vary from about .85 for an interval of 7 weeks to approximately .70 for an interval of 14-16 months. Both samples were of college students. (Myers & McCaulley, 1985, p. 172).

Concurrent validity is extensively documented in the MBTI Manual (Myers & McCaulley, 1985, pp. 175-223). MBTI dimensions correlate significantly with elements of other personality, vocational preference, education, and management style instruments in the range of .40 to .77. Construct validity is supported by a large number of studies documented in the Manual, including occupational preferences (Myers & McCaulley, 1985, pp. 77-93; Myers & Myers, 1980, pp. 27-51, pp. 167-174) and studies of creativity (Myers & McCaulley, 1985, p. 214f).

MBTI theory posits that individuals have preferences that affect what they pay attention to in a given situation and how they draw conclusions or make decisions about what they perceive. They will also have a preference for directing their attention to the outer world or the inner world; when they deal with the outer world, they will normally deal with it in either a data-gathering way or in a decision-

making way. While all people develop the ability to act in both poles of each of the four dimensions, theory posits that they have a natural preference for one or the other of the poles and, all other things being equal, will gravitate toward that preference. All preferences are considered normal variants of personality.

The MBTI treats four indices:

Extraversion (E) - Introversion (I): An Extravert[5] is energized by interaction with others and puts primary interest in the outer world of people and events. An Introvert tends to be energized by solitary activities and is oriented primarily toward concepts and ideas in the inner world.

Sensing (S) - Intuition (N): Relying on data gathered through the five senses, a person with a preference for Sensing perception sees the world in a practical and factual way. An Intuitor, on the other hand, is likely to be aware first of relationships, possibilities, and meanings and will be drawn to the innovative and theoretical. (Intuition is abbreviated with "N," because "I" is used for Introversion.)

Thinking (T) - Feeling (F): A preference for Thinking judgment results in decisions made on impersonal, objective, cause-and-effect criteria. Judgments made on Feeling grounds are made on the basis of personal or social values and automatically take into account personal relationships and the feelings of others.

Judging (J) - Perceiving (P): Describes the process the individual mostly uses to deal with the outside world. A person who prefers Judging deals with the outside world through Thinking or Feeling (the judging process) and is likely to gravitate toward a planned, organized, and controlled life. A Judging type wants closure. The Perceiver, on the other hand, deals with the outer world through Sensing or Intuition (the perceiving process) and values spontaneity, flexibility, freedom, and autonomy. The Perceiver likes to "play it by ear," adapt, and stay open.

Each of the four dimensions is independent of the other three, so that there are 16 possible combinations of preferences, called "types," each of which is referred to by the initial letters indicated above. For example, a person with preferences for Extraversion, Sensing, Thinking, and Judging is referred to as an ESTJ; a person who prefers Introversion, Intuition, Feeling, and Perception is referred to as an

INFP. Type distributions of a sample are usually displayed in a conventional array called a "type table," (e.g., Tables I, IV, and V).

Type samples seldom fall into a normal distribution pattern. The figures that are usually used for the U. S. population at large are approximately 75% Extraverted, 25% Introverted; 75% Sensing, 25% Intuitive; (males) 60% Thinking, 40% Feeling; (females) 35% Thinking, 65% Feeling; 55-60% Judging, 40-45% Perceiving (Myers & McCaulley, 1985, p. 45).

Qualitative instrumentation. In addition to the MBTI and the SILL, interviews ranging from 15 to 60 minutes provided further data. Because the interviews were almost all part of the routine administration of long-term intensive training, no rigidly standardized interview protocol was used. However, the general set of questions was very similar from one interview to another and can therefore be considered an informal, semi-structured, qualitative instrument. The usual sequence of questions is listed below:

- How do you feel about the way your course is going (or went)?
- How well do you think you are progressing? (or for end-of-training interviews, How do you feel about your performance?)
- What learning techniques seem to have worked for you, and which have not?
- What other factors have had an effect on your training?
- Has your increased knowledge of the MBTI and psychological type made a difference to your training?
- What else would you like me to know about your training experience?

Outcomes were described by performance ratings. Because all but one of the students achieved their end-of-training proficiency goals, and because the differences between their FSI proficiency ratings were small, they were rated on other grounds. The letter grades used here are meant to indicate overall cost-benefit ratio success as a language student. The grades represent a consensus of the opinions of the project director, and those of the teachers, based on the amount of effort required by the student and teachers for the

student to achieve proficiency, and on the level of proficiency achieved. They are a kind of abbreviation for suggesting whether the student would be expected to do well in future intensive non-Indo-European language training.

It is important to make the distinction between typical proficiency ratings, which describe ability to use the language in relation to prespecified criteria not tied to a particular curriculum, and the performance ratings (grades) described in this paper, which indicate the degree to which the end-of-training results were appropriate and cost-effective in terms of time and energy spent by students and teachers. The FSI S- and R-ratings are proficiency ratings; the A, B, C, D grades that were used in this study are performance/efficiency ratings.

Data Collection

Instructors in Indonesian, Japanese, Thai, and Turkish were invited to participate in a staff training exercise. They completed the MBTI, had a three-hour group interpretation session, and then participated in a one-day workshop on learning and teaching based on type concepts. A number requested and received individual discussions of their MBTI results. Approximately six weeks later they completed the SILL. Italian and Hungarian instructors completed the MBTI as part of team-building exercises and were invited to participate in the MBTI-SILL study later.

Students entering training in Japanese, Thai, and Turkish in August 1986 were asked to participate in the research project on a volunteer basis. All of them agreed to complete the MBTI; like the teachers, they were given a three-hour MBTI interpretation and one-day type-and-learning workshop. All but six completed the SILL four to six weeks later, after they had the opportunity to exercise language learning techniques in the course of their classroom training. All FSI participants in the study received a group presentation on the SILL and the meanings of the SILL factors.

The professional language trainers were invited to participate in the study at various intervals. Most of the FSI and CAL staff completed the MBTI as part of team- building exercises. They completed the SILL when they agreed to participate in the project.

Because of the possible effects of language and culture on the

teachers when they completed the MBTI, extra effort was made to be sure they understood and validated the results of the MBTI for themselves. For this reason, it was most important that the administrator be well trained in the MBTI (she received professional qualification through an intensive six-day program).

Qualitative data collection took place through the series of interviews mentioned above. In the course of normal long-term language training (roughly 20-44 weeks), each student received two written progress reports. As part of the feedback procedure, presentation of the progress report was accompanied by an interview, which usually lasted from 15 to 60 minutes, depending on how much the student wished to discuss. At the end of training, as part of the presentation of the end-of-training written evaluation, there was another interview. At this time, students were asked to give their opinions about the training they had received and to mention anything else they would like the training faculty to know. These interviews also lasted between 15 and 60 minutes.

These routinely scheduled interviews were used as an opportunity to get information on the way students learn language as seen through their own eyes. After the data were collected, the interviewer offered suggestions and counsel in response to problems and questions that had come up during the interview, using concepts from the MBTI and the SILL as appropriate. Notes were taken during the interviews, then written in a chronological log that covered an entire academic year. This log was the raw material for the qualitative analysis.

Data Analysis

Quantitative analysis. The MBTI results are scaled on the four dimensions named earlier. Thus, each person received a score for Extraversion (E) versus Introversion (I), Sensing (S) versus Intuition (N), Thinking (T) versus Feeling (F), and Judging (J) versus Perceiving (P). The psychological type was designated by the four letters indicating the person's preference on each of the four bipolar scales.

Each of the 121 SILL items was associated with one and only one factor from the DLI factor analysis for scoring purposes. Every person was then given a score on each of the SILL factors. Although an index score, the average of the 10 factor scores was also calculated.

It was not found to be particularly explanatory and was therefore dropped.

Descriptive statistics were obtained through SAS for the MBTI and SILL results. Then a multivariate analysis of variance procedure, the SAS general linear model procedure, was used to examine the relations among the variables, with MBTI types and preferences as the independent variables and SILL factor scores and sex and occupation as dependent variables. Results were considered statistically significant if they reached the .05 level and suggestive if they reached the .06-.10 level. Variables that were treated are listed here:

Biographical:	Sex and occupation
MBTI Type:	Extraversion, Introversion, Sensing, Intuition, Thinking, Feeling, Judging, and Perceiving, all the two preference combinations (e.g., Intuition-Feeling), and the 16 types (e.g., ENFP).
Learning Strategy:	The 10 factors on the version of the SILL in use at FSI (see above under the Instrumentation heading).

Quantitative data were examined for patterns and regularities that related to the hypotheses stated above. For the purposes of this chapter, the strongest and weakest learners in the larger sample were selected, based on teacher ratings.[6] An analysis using the Selection Ratio Type Table (SRTT) developed by the Center for Applications of Psychological Type yields the information presented in Tables VII and VIII. The SRTT compares type tables, dividing the actual number of members of a group by the number that would be expected by the null hypothesis to derive a "self-selection index" (indicated by "I" in each cell and over the last column).

Qualitative analysis. For qualitative analyses, a coding form was developed, including the following categories: name, occupation, agency, age, sex, language studied, previous language learning experience, and other demographic variables; MBTI-revealed

TABLE VII

Source of data

FSI MBTI Project Subjects
Asian and African Dept.

Group tabulated:

"good" students by teacher ratings

N = 12

MBTI Type Table
Center for Applications of
Psychological Type

Legend: % = percent of total choosing this group who fall into this type.
I = Self-selection index: Ratio of percent of type in group to % in sample

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ N = 1 % = 8.33 I = 1.10	**ISFJ** N = 1 % = 8.33 I = 1.65	**INFJ** N = 0 % = 0.00 I = 0.00	**INTJ** N = 1 % = 8.33 I = 1.10
ISTP N = 1 % = 8.33 I = 1.65	**ISFP** N = 0 % = 0.00 I = 0.00	**INFP** N = 2 % = 16.67 I = 2.19	**INTP** N = 2 % = 16.67 I = 1.32
ESTP N = 0 % = 0.00 I = 0.00	**ESFP** N = 0 % = 0.00 I = 0.00	**ENFP** N = 1 % = 8.33 I = 1.10	**ENTP** N = 0 % = 0.00 I = 0.00
ESTJ N = 1 % = 8.33 I = 0.94	**ESFJ** N = 1 % = 8.33 I = 1.10	**ENFJ** N = 1 % = 8.33 I = 2.19	**ENTJ** N = 0 % = 0.00 I = 0.00

				N	%	I
J			E	4	33.33	0.68
U			I	8	66.67	1.32
D	I		S	5	41.67	0.97
G	N		N	7	58.33	1.02
I	T		T	6	50.00	0.84
N	R		F	6	50.00	1.23
G	O		J	6	50.00	0.94
	V		P	6	50.00	1.07
P	E	I	J	3	25.00	1.04
E	R	I	P	5	41.67	1.57
R	T	E	P	1	8.33	0.41
C	S	E	J	3	25.00	0.86
E		S	T	3	25.00	0.99
P		S	F	2	16.67	0.94
T		N	F	4	33.33	1.46
I	E	N	T	3	25.00	0.73
V	X	S	J	4	33.33	1.14
E	T	S	P	1	8.33	0.60
S	R	N	P	5	41.67	1.27
	A	N	J	2	16.67	0.69
J	V	T	J	3	25.00	0.76
U	E	T	P	3	25.00	0.94
D	R	F	P	3	25.00	1.23
G	T	F	J	3	25.00	1.23
I	S	I	N	5	41.67	1.32
N		E	N	2	16.67	0.66
G		I	S	3	25.00	1.32
		E	S	2	16.67	0.69

Base population (N = 79) used in calculating selection ratios: All students, teachers, and professional language trainers in the larger sample. Sample and base are dependent (i.e., the smaller sample is a subset of the larger sample).

TABLE VIII

Source of data

FSI MBTI Project Subjects
Asian and African Dept.

Group tabulated:

"weak" students by teacher ratings

N = 10

MBTI Type Table
Center for Applications of
Psychological Type

Legend: % = percent of total choosing this group who fall into this type.
I = Self-selection index: Ratio of percent of type in group to % in sample

SENSING types with THINKING	SENSING types with FEELING	INTUITIVE types with FEELING	INTUITIVE types with THINKING
ISTJ N = 1 % = 10.00 I = 1.32	**ISFJ** N = 1 % = 10.00 I = 1.97	**INFJ** N = 0 % = 0.00 I = 0.00	**INTJ** N = 1 % = 10.00 I = 1.32
ISTP N = 1 % = 10.00 I = 1.97	**ISFP** N = 0 % = 0.00 I = 0.00	**INFP** N = 1 % = 10.00 I = 1.32	**INTP** N = 0 % = 0.00 I = 0.00
ESTP N = 0 % = 0.00 I = 0.00	**ESFP** N = 0 % = 0.00 I = 0.00	**ENFP** N = 1 % = 10.00 I = 1.32	**ENTP** N = 0 % = 0.00 I = 0.00
ESTJ N = 2 % = 20.00 I = 2.26	**ESFJ** N = 0 % = 0.00 I = 0.00	**ENFJ** N = 0 % = 0.00 I = 0.00	**ENTJ** N = 2 % = 20.00 I = 2.26

			N	%	I
J		E	5	50.00	1.01
U		I	5	50.00	0.99
D	I	S	5	50.00	1.16
G	N	N	5	50.00	0.88
I	T	T	7	70.00	1.18
N	R	F	3	30.00	0.74
G	O	J	7	70.00	1.32
	V	P	3	30.00	0.64
P	E	I J	3	30.00	1.25
E	R	I P	2	20.00	0.75
R	T	E P	1	10.00	0.49
C	S	E J	4	40.00	1.37
E		S T	4	40.00	1.58
P		S F	1	10.00	0.56
T		N F	2	20.00	0.88
I	E	N T	3	30.00	0.88
V	X	S J	4	40.00	1.37
E	T	S P	1	10.00	0.72
S	R	N P	2	20.00	0.61
	A	N J	3	30.00	1.25
J	V	T J	6	60.00	1.82
U	E	T P	1	10.00	0.38
D	R	F P	2	20.00	0.99
G	T	F J	1	10.00	0.49
I	S	I N	2	20.00	0.63
N		E N	3	30.00	1.19
G		I S	3	30.00	1.58
		E S	2	20.00	0.83

Base population (N = 79) used in calculating selection ratios: All students, teachers, and professional language trainers in the larger sample. Sample and base are dependent (i.e., the smaller sample is a subset of the larger sample).

psychological type and spontaneous comments that might be related to type; linguistic liabilities and assets; non-linguistic liabilities and assets; specific strategies mentioned in the interview; attitudes toward the program, the instructor, other students, and oneself as a language learner; overall satisfaction with the language training program; and quality of performance in language learning as rated by the program director in consultation with the teachers.

In the interest of reliability, Rebecca Oxford, a colleague and originator of the SILL, was asked to perform a quick independent analysis of the qualitative data. With the project director, Oxford compared separate interpretations for reliability, going back to the raw interview data to resolve any inconsistencies. The project director also checked her own interpretations of the student interview data against comments about the same students from teacher interviews, thus ensuring increased reliability of interpretation and providing a form of concurrent validity. Finally, qualitative data were compared against the results of the quantitative study. In those few instances when there seemed to be discrepancies between qualitative and quantitative results, the director was challenged to find explanations and to resolve the differences on the basis of psychological type theory.

The variables in the qualitative study were the following:

Independent variables— The variables included MBTI preferences (Extraversion, Introversion, Sensing, Intuition, Thinking, Feeling, Judging, Perceiving); MBTI function pairs (Sensing Thinking, Sensing Feeling, Intuitive Feeling, Intuitive Thinking), and temperament pairs (Sensing Judging, Sensing Perceiving, Intuitive Feeling, Intuitive Thinking); age (in decades); sex; occupation by government agency; and career function. Note that the function pairs overlap with the temperament pairs for the combinations that include Intuition; both sets include Intuitive Thinking (NT) and Intuitive Feeling (NF).

Dependent variables— The dependent variables included student behavior, attitudes, desires, and critiques (largely self-reported); and performance ratings.

Findings

Up to now, this project has been a pilot study, with small samples and a certain amount of trial-and-error in methodology. Results must therefore be considered preliminary, but they are nonetheless promising and suggestive.

Reception within the School of Language Studies

With staff— Teachers report that they have found the MBTI and psychological type useful in advising students and in designing activities for individual students and for whole classes where there was some homogeneity of personality type. They also report that it has been of real value in their interactions with each other, especially in a section where there was considerable division between Thinking and Feeling teachers. They report making explicit use of the MBTI concepts and their knowledge of type when conferring about students. The MBTI has clearly become a useful tool for participating teachers in their efforts to individualize their treatment of students.

With students— There were two groups of students, one group began in August, and a smaller group began in February. The August students had mixed reactions: Their major concern was the time taken from their language study when students were fresh and enthusiastic. On the other hand, many students found it useful at the time, and others came to see greater utility in the MBTI approach as they continued their language training. Because of the negative reactions described above, in February, students were not invited to participate in the program until several weeks after they had begun training. This resulted in more uniformly positive reactions. It was possible to tell students that the MBTI had been useful to others in the SLS context, while for the first group no such assurance was possible.

Many students report having made use of their MBTI-based insights into themselves to increase their study efficiency and to work more comfortably with classmates. Type has been an invaluable tool in academic counseling of students, not only because it provides a theoretical model to account for behavior, but also because it is the source of shared vocabulary used in discussions with students.

One group of students reported making explicit use of knowledge of each other's MBTI preferences when their class was regrouped, and they had to adjust to a new set of classmates. They looked at each other's types and reviewed what they had learned in the learning styles workshop, predicting for each other how they would probably like to learn and where the differences would be. They even worked out some compromises in the training approach they would ask for from the teachers based on their type insights. For those students who are open to the MBTI, it is a tool of considerable value.

In addition to the research and development project described above, the MBTI has proven useful in School of Language Studies organization development contexts. Applications have included team building and a successful conflict resolution series in which MBTI type provided the initial shared concepts and a neutral way to accept differences.

Quantitative findings. The statistical analysis of the data on the MBTI and SILL variables and sex and occupation data resulted in a number of significant findings at least at the .05 level. Some were hypothesized in advance as described above, and some were serendipitous. The results of the analysis are summarized below but are reported in much greater detail in Ehrman and Oxford (1989) and Oxford and Ehrman (1989).

- Extraverts were significantly more likely than Introverts to report use of affective strategies and visualization strategies.
- Introverts (compared with Extraverts) reported more frequent use of strategies for understanding and communicating meaning.
- Intuitives preferred formal model building strategies, strategies for understanding and communicating meaning, authentic language use, and affective strategies, relative to Sensing types.
- Sensing types indicated no significant strategy preferences.
- An anticipated preference by Thinkers relative to Feelers for formal model building did not occur.
- Compared with Thinkers, Feelers reported greater use of

general study strategies.

- Judgers reported greater use of general strategies than Perceivers.
- Perceivers had higher scores than Judgers for use of strategies for understanding and communicating meaning.
- Professional language trainers (mostly Intuitive Thinkers, and almost all of whom held advanced degrees in linguistics) reported far greater use of language learning strategies than did regular instructors (who were native speakers of the languages they taught but had little or no formal training in linguistics) or students (who were mostly Foreign Service Officers).
- Regular teachers surpassed students only in authentic language use.
- Females reported a far greater use of learning strategies than did males.

Examination of the data in Tables VII and VIII shows that there were no statistically significant results to indicate relative success as learners. However, the self-selection ratios on Table VI suggest that of all the preference combinations, there are "good" NF learners in excess of the proportion of NF students in the sample at large (selection ratio I = 1.46). Proportions of other combinations seem closer to the overall sample proportions. These results are consistent with informal experience with FSI's relatively few NF students.

On Table VIII, which examines the relatively unsuccessful learners from the sample, the selection ratios point to TJ (I = 1.82), ST (I = 1.58), and IS (I = 1.58) as the preferences most associated with less satisfactory outcomes. The numbers are small, and the statistics are not significant, so this is information that can serve as the source of further research, at best.

Qualitative findings. Intensive analysis of the interview data yielded clear differences in the kinds of strategies reported by representatives of the different type preferences. The Extraversion/Introversion scale had an effect on study patterns, as did Judging and Perceiving. Thinking/Feeling was an important factor in the kind of relations a student established with teachers and classmates and for the topics that appealed to students (Thinking types looked

primarily for work relevance; Feeling types tended to have broader interests). All the Thinking students made use of analysis and employed strategies to satisfy their great need for control of self, the learning process, and the details of the language. Feeling types, on the other hand, largely rejected analysis and showed a generalized affiliative orientation.

The most important cognitive dimension was Sensing/Intuition. When students had difficulties, they showed different patterns of weakness depending on whether they preferred Sensing or Intuition. In general, Intuitive students had relatively little difficulty with matters of technique and learning; their problems seemed to be related to the way they felt about themselves, their competence, their classmates, their teachers, and the language and culture. Sensing students were more likely to be troubled by techniques like listening for gist, coping with over-the-head material and loosely structured material. Their strength tended to be matter-of-fact, systematic hard work that often paid off in proficiency at the end of training.

Some of the most salient assets and liabilities of each of the preference poles are extracted from a much more lengthy report (Ehrman & Oxford, 1989) and presented in Table VIII. Reference is made to other findings from the qualitative analysis throughout the following sections as well.

Discussion

The following discussion is based on observations and interpretations of the data from the two studies. The statements that follow must be regarded as tentative, in view of the small sample and the particular context. Furthermore, they represent an analysis by a trained MBTI user; those untrained in the MBTI might not come to the same conclusions about the data.

Insights about the Foreign Service and the Department of State

Type theory has provided insight into behavior observed in Foreign Service Officers (FSOs) and into what underlies the organizational culture of FSI and the Department of State. About 60 percent of entering Foreign Service Officers over a two-year period reported preferences for Intuition and Thinking; roughly the same

TABLE IX

OUTLINE OF RESULTS OF THE QUALITATIVE ANALYSIS

Major Assets Associated with Each Preference

Extraversion:	Willing to take conversational risks.
Introversion:	Concentration, self-sufficiency.
Sensing:	Hard, systematic work; attention to detail, close observation.
Intuition:	Inferencing and guessing from context, structuring own training, conceptualizing and model-building.
Thinking:	Analysis, self-discipline; instrumental motivation.
Feeling:	Integrative motivation, bonding with teachers, good relations lead to good self-esteem.
Judging:	Systematic work, get the job (whatever it is) done.
Perceiving:	Open, flexible, adaptable to change and new experiences.

Major Liabilities Associated with Each Preference

(Note: not all students showed these liabilities.)

Extraversion:	Dependent on outside stimulation and interaction.

Introversion:	Need to process ideas before speaking sometimes led to avoidance of linguistic risks in conversation.
Sensing:	Hindered by lack of clear sequence, goals, syllabus, structure in language or course.
Intuition:	Inaccuracy and missing important details, sought excessive complexity of discourse.
Thinking:	Performance anxiety because self-esteem was attached to achievement, excessive need for control (language, process).
Feeling:	Discouraged if not appreciated, disrupted by lack of interpersonal harmony.
Judging:	Rigidity, intolerance of ambiguous stimuli.
Perceiving:	Laziness, inconsistent pacing over the long haul.

From: Ehrman, M. E. (1989). *Ants and grasshoppers, badgers and butterflies: Qualitative and quantitative investigation of adult language learning styles and stategies.* Dissertation Abstracts International. University Microfilms No. 9005275.

proportion preferred Introversion (Hahn-Rollins & Mongeon, 1988). This is in considerable contrast to the U. S. population at large, for whom only about 25 percent prefer Introversion and Intuition. Thinking is preferred by about 60 percent of males but only 35 to 40 percent of females in the U.S. population; in contrast, Hahn-Rollins and Mongeon (1988) report that roughly 80 percent of Foreign Service Officers of both sexes prefer Thinking.

A strong preference for Thinking is likely to lead to a detached stance and relative lack of interest in individuals, while Intuition tends to lead to abstraction rather than "hands-on" observation. The combination of Introversion, Intuition, and Thinking seems to suggest someone who would much rather be writing position papers and analytical pieces than talking about ordinary subjects with ordinary people. Furthermore, the preference for Thinking that seems to characterize FSOs militates against interaction except for instrumental purposes. The Introverted Intuitive Thinker types who heavily populate the Foreign Service have tended to be drawn to it less by a desire for interaction than by a desire to analyze and help make foreign policy.

The prevalence of preferences for Introversion and Thinking among FSOs may also help account for the fact that FSI graduates generally prefer to continue their language learning in a classroom overseas, rather than through interaction with local native speakers. This observation has implications for in-country training of these students.

In the classroom, FSI students who are officers tend to be highly competitive; many of them could even be described as driven. Those who are Intuitive Thinkers (NTs) do not have difficulties with the mechanics of language learning, yet frequently seem to have intense reactions to the difficulties in meeting their own (often unrealistically) high standards. Some NT students may become very critical of the teachers and the training program. Some of these students cause not only wear and tear on the teachers, but also an unpleasant atmosphere among their classmates, who see them as "squeaky wheels" getting greased, despite teachers' best efforts to give even-handed treatment. Scapegoating of the program and its personnel sometimes occurs when students—especially NTs—are not doing as well as they wish to do.

MBTI type has cast considerable light on what is happening here. Because easily two-thirds of the FSI student population consists of State Department officers, the proportion of NTs is very high. It approaches 40 percent, in contrast to the roughly 12 percent of NTs represented in the U. S. population at large, as reported by Keirsey and Bates (1984).

NTs are characterized by a need for competence, achievement, and control, usually in the form of knowledge. They tend to have high standards for themselves and to escalate those standards as they begin to meet them. As David Keirsey said, they are constantly taking their conceptual temperatures (1984, p. 49).

Used to being in control and in situations where they can demonstrate competence, these officers are suddenly students, without the offices and staff to which they have become accustomed. They are both ignorant (of the language) and incompetent (at communicating in the foreign language); they may be unskilled at language learning. Most must reach a rather high level of proficiency by the end of training. Until they begin feeling competent and some level of control, they experience a high level of anxiety, which they express by criticism and complaint.

Needless to say, SLS has been aware for a long time that language training is anxiety provoking for many of its students. Teachers and staff have tried a number of ways to make the experience less stressful, including experimentation with student-centered methodologies. While some of these have been pedagogically successful with some students, they have not been especially useful for reducing anxiety in the kind of student described above. In fact, the new methodologies have become the subject of increased criticism from these students, who may perceive them as "touchy-feely."

Other efforts have been made to help entering students reduce their unrealistic expectations of their performance. NT students tend to be highly successful products of at least 20 years of conventional education, with its emphasis on competition and grades; the NTs establish goals of 100 percent mastery in that context. Efforts to deprogram this kind of thinking meet with partial success, but still not enough.

Like most FSI innovations, the attempt to help students perceive appropriate mastery of language as a continuing process has been

better accepted when it has been established as a regular portion of the program and is no longer called an "experiment." (This may be because something that is experimental may imply, if not lack of competence on the part of the experimenter, at least lack of knowledge. NTs base much of their lives on competence and knowledge.)

Type has been useful to a number of students in their understanding of what causes tension and difficulty for them. Approximately 75 percent of these students are NTs; roughly 25 percent are Sensing Thinkers (STs). Material from Keirsey's *Please Understand Me* (1984) has been used at FSI with several NT students to help them understand the degree to which they can be their own worst enemies. They respond to the descriptions of the NT with rueful self-recognition and have used the self-knowledge to try to keep their reactions in greater perspective.

Thinking students do not automatically express appreciation of their teachers, appreciation that would be reassuring for the teachers. Because of this, psychological-type concepts were introduced to the students as a way of pointing out the benefit of demonstrating appreciation. The instrumental approach of most Thinking students was used to show them that, by a process of cause and effect, their needs would be better met by behavior that might not come naturally to them. In the follow-up workshop on learning styles, it was pointed out to the students that many of the teachers have very different preferences from those of the students, especially on the T/F dimension. Students learned that they would receive the best teaching from staff with high morale, and that teachers respond well to explicit expressions of appreciation of a sort that the students themselves might not feel is necessary.

Instructors in several sections reported that this intervention made a difference, that the students who received this briefing were more expressive of appreciation than those in previous classes. In individual student counseling sessions, the program director reminded students that individuals have different levels of need for appreciation.

A Sensing-Intuitive Symbiosis

The 99 teachers of Asian and African languages from FSI and the Defense Language Institute who have taken the MBTI have revealed

a heavy preference for Sensing (81%). Whether this is a matter of occupational self-selection or whether it represents preference distributions in the teachers' home cultures is, at this point, an open question. The largest language group to take the MBTI at FSI so far has nine members; many others have only one or two representatives. These populations are clearly far too small to serve as samples for whole cultures. Furthermore, almost all of them come from Asia and the Middle East.

On the other hand, some occupational self-selection is a possibility. The best teachers are highly sensitive to cues, both linguistic and nonverbal, from students. They are adept at adaptation to student needs, often without being aware of what they are doing. Both Thinking and Feeling teachers are equally capable in this crucial skill, but sharp and accurate observation seems to be a gift of the Sensing function.

In the quantitative study described above (the 78-person study), the language training supervisors preferred Intuition (95%) whereas the language teachers preferred Sensing. This has resulted in a fortunate symbiosis in the Asian and African Languages Department. The instructors tend to be focused on what happens in the classroom. They are fulfilled by their teaching work and do not lose interest in it from year to year. Some of the Intuitive supervisors express both surprise and admiration for this ability, because they themselves feel confined by this kind of teaching for five or six hours a day.

The Intuitive supervisors, on the other hand, tend to take an automatic interest in staying in touch with the fields of second language acquisition and applied linguistics. Many have an urge to investigate and disseminate their findings both inwardly and outwardly. The majority of the supervisory staff wants to generate ideas for their programs and undertake projects that have a broad scope, and much of their work lends itself to this kind of effort. They contribute vision and broad-gauge structure to the programs for which they are responsible; the teachers provide great creativity in bringing visions to life in the classroom.

Observations of Student Behavior

The following comments are based on the qualitative analysis of the data and on informal observations of nearly 100 students. Although they add little new information to type theory, they certainly confirm for foreign language study what others have said about type and learning (Lawrence, 1984). NT behavior as described above is quite consistent with descriptions by Myers (1980) and Keirsey (1984). In addition, certain students of a variety of type preferences seemed to exemplify so thoroughly the behavior that type theory would predict that they served as sources for case study descriptions.

The Sensing Thinking students—especially the Judging types—tended to like clearly structured, step-by-step work, though many of them have well-developed inferencing skills; the NTs wanted to be involved in global models, either of the language or of the content about which they were talking. When Sensing students had trouble with language learning, it was because they stumbled on guessing from context, making inferences, taking a global view, or coping with the need to impose structure on apparently chaotic material. Intuitives often had trouble in language learning because they wanted to make things too complex, because they had excessive and constantly escalating expectations of their own performance, or because interpersonal relations interfered with their ability to focus on language learning.

None of the Feeling students were seen as difficult to get along with by colleagues or teachers; those who were perceived as difficult were without exception Thinking types. (Naturally, it is not true that all Thinking types experience interpersonal difficulty—most of the Thinkers enjoyed excellent relations with their colleagues and teachers.) One of the language sections had an unusually large proportion of Feeling students, and it was notable that year for the harmony that prevailed among the students and between students and teachers.

Judging and perceiving have made less visible difference in our context. All of our students have learned enough judging skills to achieve to considerable levels in the American social system. Sensing Perceiver (SP) students had less difficulty than Sensing Judger (SJ) students in staying open to more data when they heard or read a new word. (This was a problem far more for Sensing than Intuitive

students, probably because the Intuitives were already oriented to looking for the gist and not worrying about unclear details.) Only one of five SP students in the quantitative sample had difficulty of this sort with over-the-head material; the inclusion of more SP students in future samples would help confirm this initial observation.

Knowledge of type contributed directly to constructive suggestions to an ESFP who got restless sitting for long hours in class. Because sensing perceivers need change and activity, it was proposed that he leave class for a while when sitting still became too much for him, because what he probably most needed was some physical action and a change of scene and pace. He did so on a few occasions and reported that it helped him concentrate the rest of the time. It is possible that the permission to meet his personality type needs made as much difference as the activity itself.

Applications in a Cross-Cultural Context

Perhaps the most broadly significant point about type is its cross-cultural applicability. Teachers from a wide range of cultures have taken the MBTI, received interpretations of its results, and accepted the validity of type descriptions and the model for themselves. In teacher training sessions, they have described how Extraversion and Introversion are expressed differently in some of the cultures involved, but the underlying model seems to work for the 48 participating instructors.

In addition, the model has worked on a practical basis both among teachers of the same language and between teachers and their American students. Mentioned above are some cases where teachers were able to use type to understand and work with divisions among themselves; they have also been able to make appropriate instructional interventions for specific students.

The one place that extra care is necessary is in interpretation of the results of the MBTI questionnaire. The process of interpretation involves an opportunity for respondents to guess at their types before receiving the results of the questionnaire; sometimes their guesses are different from the MBTI results. As they discuss the interpretation of their answers with the administrator, respondents can clarify their true preferences.

In the course of the interpretation sessions, teachers change from their "tested" types more often than our American students. This may be because there are linguistic and cultural ambiguities in and misunderstandings of the questions of the Indicator that are resolved in the interaction of the interpretation sessions, both group and individual. The MBTI is of great potential use with people of other cultures, but in the absence of valid translations, great care must be taken in using "feedback" and in verifying that the respondent has understood and validated the results.

Next Steps in SLS

The activities described here are only a beginning. Some potential activities that would increase the utility of the MBTI in the School of Language Studies might include the following:

- Expand the research project beyond the pilot level. Now that there are concrete results, the research project can be presented to entering students as part of their program, not just as an experiment. This should enhance acceptance. The substantial base of trained teachers may permit use of the MBTI for all the purposes described above more widely than previously, so that a larger subject population will be available.
- Include the MBTI as part of the entrance routine for all language students. The MBTI can be part of a battery of instruments administered to entering language students to measure aptitude and language learning style. It will be most valuable if followed by optional workshops on learning styles that help students apply it and learning strategy training targeted on the basis of individual type factors.
- Include type in formal staff development programs. A module on student psychology would be a valuable portion of the SLS in-service instructor training program. The Indicator and some elementary type theory would contribute substantially to such a module.

Conclusions

General Suggestions about Language Aptitude Assessment

Discussions of learning aptitude tend to treat it as a kind of internal characteristic that is an individual difference or trait. It may make more sense not to talk of testing an aptitude trait, but to think in a more general way about prediction of language learning success. In fact, this is what interests users of language aptitude tests.

This revised wording implies that assessment is targeted to specific learning environments with concomitant precision in the fit of the results to proposed learning circumstances. One promising way to assess probability of success in a program is to design a battery of instruments that will produce a profile addressing a variety of dimensions: cognition, motivation, learning styles, preferred learning strategies, and previous learning experience. Some form of interview would add substantially to the validity of the other elements of the assessment battery.

Furthermore, such an assessment profile can be used not only for purposes of selection or placement, but also—and preferably—for diagnosis, counseling, and targeting of training, both in learning strategies and in the language itself. Emphasis on these latter purposes is more likely to gain undistorted responses than will use for purposes that hold an element of threat to an individual's academic future or career.

Type and Prediction of Learning Success

The question that most people ask first—Are certain types better language learners?—is difficult to answer without overgeneralization. The samples on which the conclusions are based are very small so far, especially in view of the many variables other than type that can affect language learning (e.g., age, previous study, motivation, outside distractions). This fact suggests that the reader maintain a skeptical attitude toward the preliminary conclusions described here.

The data have shown good language learners of most types; likewise, weak ones are widely scattered over the type table, and most cells of the type table have had representatives of both classes. Type Tables VII and VIII display the distribution of the best and

worst students in the pilot study sample. They are widely scattered and there were no statistically significant patterns in either table. A tentative conclusion can be made that no one type has an overwhelming edge in language learning.

On the other hand, if any preference or preference combination were to prove to be stronger in general, it would be Intuitive Feeling (NF), because people with these preferences appear to be natural communicators. They are able to learn with a variety of methodologies (Intuition) and tend to form the bonds (Feeling) with teachers and classmates that reduce the debilitating performance anxiety that many Intuitive Thinkers experience.

Simple examination of the data in Table VII suggests that of all the preference combinations, there are "good" NF learners in excess of the proportion of NF students in the sample at large. Informal, impressionistic experience with our relatively few NF students appears to confirm this hypothesis. Those NFs who have had difficulty appear to be stymied by the need to analyze or by limits to retention of learned material.

Evidence from the intensive qualitative analysis of student interviews supported the hypothesis that NFs would do especially well and also suggested advantages for Perceivers and Introverts, at least in the context of FSI classrooms using heavily (but not exclusively) communicative methodology.[7]

The quantitative research suggested associations of MBTI type preferences with strategies that appeared advantageous in other studies (Oxford, 1988; McGroarty, 1988). For example, Introversion, Intuition, and Perceiving were associated with searching for and communicating meaning; Feeling and Perceiving were associated with general study strategies that are helpful in any subject, and Intuition was associated with hypothesis formation and testing and formal model building (Ehrman & Oxford, 1989; Oxford & Ehrman, 1989).

Perhaps the most significant finding from the qualitative study was the fact that the best learners seem to be able to maximize the benefits from the strategies associated with their preferences and also access some that are associated with non-preferred processes. That is, the best learners had a degree of versatility that less able ones did not.

The Importance of Multiple Factors

Language aptitude—or better put, successful learning, even in the relatively limited context of the intensive full-time classroom—is a complicated matter. It seems increasingly likely that it is not a unitary factor but rather the confluence of a variety of circumstantial and psychological variables. Internal variables of cognitive style, motivation, need for affiliation, need for control, flexibility, comfort with unstructured stimuli, liking for teachers, sensitivity to cross-cultural values, and ego-boundary permeability, interact with such external factors as goal and purpose of learning, setting, immediacy of real-life use, methodology, and other demands on student time. Choice of language learning strategies may intersect with all of these. Age-related factors are important; much has been learned about the conditions that facilitate the learning by older students (Ehrman, 1987; Schleppegrell, 1987).

The preliminary results of the Defense Language Institute Language Skill Change Project suggest that internal variables may account for less than half of the predictability of language learning success (Lett & O'Mara, this volume); this means that there are factors beyond those any aptitude test can measure that have a great impact on learning outcomes. For example, the completed quantitative pilot study also shows certain relationships between psychological type, sex, career preference, and language learning techniques (results summarized above). These are only tentative because of the small size and mixed nature of the sample population, but they are certainly suggestive and may contribute to an understanding of how all these factors affect language learning success.

Appropriate Use of Psychological Type

The important question is how to use knowledge of psychological type to help learners make the most of their assets and compensate for their liabilities in a systematic way. Not only were there strong and weak learners of a wide variety of types, they did not achieve excellence in the same way. Furthermore, when they had trouble, their difficulties were distinctive as well. Because few teachers can expect to instruct only stellar students, teachers need to know how to make the most of what the more run-of-the-mill learners bring with them, and where the pitfalls are likely to be.

Learning style preferences in general and psychological type preferences in particular contribute information about certain aspects: (1) the learner's focus of attention; (2) the learner's choice of learning strategies; and (3) the kinds of experience that will enhance motivation, decrease anxiety, and affect other important, but so-far elusive, affective variables. The four MBTI scales (and intricacies of type theory not treated here that offer insight into how the non-preferred poles contribute to the personality and behavior of the learner) interact with fairly constant external variables like instructional methodology.

Results of the MBTI can thus help us make more accurate predictions about what kinds of learners will do well. For example, in a program that calls for a great deal of induction and independent self-study, Introverted Intuitives will probably do well. We can expect Sensing students to feel at home in a program that is closely structured, relies heavily on drilling, and has clearly stated and short-range objectives.

However, MBTI results must be used with care. There is much room for error. Individual expression of type preferences varies considerably. For example, some Thinking types are interpersonally warmer than others. Also, people often develop skills associated with their less-preferred functions that are not reported on the MBTI. Indeed, we have seen that such development is desirable.

Good language learners have been shown to have a number of characteristics in common (McGroarty, 1988; Naiman, Fröhlich, & Todesco, 1975; Rubin, 1975; Stern, 1975), but not all learners necessarily have all the characteristics. Interesting questions arise about which and how many of these characteristics are needed for success, and about patterns of distribution. For example, can a learner be successful if he or she has only a minimal desire to interact with people from the target culture, but has good problem-solving and memorization skills? (Observation of many FSI students suggests that the answer may be "yes.") Still more interesting is the question of which factors, internal and external, affect the learner's ability to mobilize his or her assets. For example, intolerance of ambiguity or anxiety about competence seem to block many FSI students from applying extensive reading skills they access automatically in their native language to texts in the target language.

Although for now it is only possible to say that psychological type is weakly predictive of language learning success in a limited setting (intensive career-related language training for adults, with largely communicative methodology), type contributes to answering the kinds of questions exemplified above. MBTI type can serve in several ways: (1) as a means of organizing and conceptualizing many of the factors that are known to affect language learning success; (2) as a source of useful information about the compatibility of methods and teacher styles with individual students; (3) as a source of more precise targeting of training in learning strategies and of instructional activities; and (4) as a useful way to examine differential definitions (e.g., risk-taking may mean something different for an Intuitive and for a Sensing student). In all these ways, psychological type has predictive and explanatory value in the interaction of the multiple factors affecting language learning success.

Notes

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1) Drawbacks of the MBTI include the following: (1) It requires a qualified administrator and interpreter; (2) it is difficult for teachers and counselors to use without a solid foundation in the theory behind it; and (3) it requires a certain degree of art to interpret in this light, because its cognitive style dimensions are not one-to-one with other models. One of the reasons for continued investigation of the relationship between the MBTI and language learning strategies is to enhance the utility of the MBTI model for those who are not extensively trained in its use.

There are also technical drawbacks to the MBTI. One is that, like other personality assessment instruments, it is not reliable at

the 1.0 level. Another is that the questionnaire is quite transparent and can be faked if respondents fear that its results may affect their careers. It has been necessary to give repeated reassurance that the results are for research purposes only and that students can choose not to share their MBTI types with the teaching faculty.

2) The Swiss psychiatrist Carl Jung believed that human behavior is not random, but is instead predictable and classifiable. In *Psychological Types* (1971, [orig. 1923]), Jung outlined a theory of conscious functioning that became the basis for his determination of personality type. The theory was built on two personality "attitudes" and four "functions." The attitudes were *extraversion* and *introversion*; the former refers to a person's orientation toward the object—the outer world of things and people, the latter refers to a person's orientation to the inner world of ideas, sensations, and fantasies. This distinction was fundamental in Jung's theory, but it proved insufficient to account for the differences that Jung observed in his psychoanalytic and psychotherapeutic practice.

The dichotomy of Extraversion/Introversion was therefore supplemented by a model of two sets of opposed functions: *perception* and *judgment*. The perception function deals with ways of processing sensory data, whereas the judgment function refers to ways a person makes judgments about the perceived data. The two dimensions of the perception function are Sensation—an orientation toward concrete data—and Intuition—an orientation toward abstract information. The two dimensions of the judgment function are Thinking and Feeling, which refer to an individual's tendency to base judgments either on impersonal analysis and logic, or on personal values.

Jung describes each person's conscious mind as being characterized by a tendency to one of the attitudes (Extraversion or Introversion) and one of the perception or judgment functions (Sensation/Intuition, Thinking/Feeling). This permitted eight combinations or "types," (e.g., Introverted Feeling, Extraverted Intuition, etc.).

Jung hypothesized that another function from the opposite

set would serve in a secondary role as "auxiliary" function, e.g., introverted feeling with auxiliary sensation. In Myers-Brigg's scheme, this would be an ISFP. Thus, with both sets of functions represented, there are 16 types possible.

Katherine Briggs combined Jung's scheme with her own analysis to devise the MBTI. Her daughter, Isabel Briggs Myers, continued the work, adding a fourth dichotomy (Judging/Perceiving) to arrive at a way of evaluating the 16 types of the MBTI. Space does not allow a full explanation of the MBTI theory. For further detail see Myers and McCaulley, 1985.

3) The fact that the sample was a select one means that for the most part the research was examining factors that made a difference when cognitive aptitude was factored out. The results of the qualitative study show that the factors remaining after those measured by the MLAT were factored out had a substantial impact.

4) The descriptions of the MBTI in the text and the SILL in Appendix A are taken from Ehrman & Oxford, 1989b, as are Type Tables I-IV. Tables V and VI are from Ehrman and Oxford, 1989a.

5) I have used capital letters for the names of the MBTI processes in order to help the reader keep track of them, though this is not the usual practice.

6) Outcomes are learning efficiency ratings given in consultation with the teachers. Proficiency ratings were not informative because almost all students reached their proficiency goals, and the gradations were crude. The efficiency ratings, on the other hand, examine the cost-benefit ratio, so to speak, for both teacher and student in the learning process. That is, they look at the amount of effort and pain on the part of both student and teacher to reach the end result.

7) It is tempting to think that Extraverts may do better in naturalistic learning settings than do Introverts. This is certainly likely to the degree that they may make greater use of social and interactive

strategies and thus gain more language use. On the other hand, Introverts are less handicapped than they might seem in naturalistic learning. Introversion does not mean a lack of desire for human contact; it does tend to mean a preference for contact with only one or a few people at a time. Because most interactive communicative situations are dyadic, the handicap for Introverts who have target culture acquaintances is less than it might appear.

APPENDIX A

THE STRATEGY INVENTORY FOR LANGUAGE LEARNING

The Strategy Inventory for Language Learning (SILL) was developed for the Army Research Institute and the Defense Language Institute (Oxford, 1986). It is a 121-item, Likert-scaled, self-report instrument that assesses the frequency with which the respondent uses a variety of different techniques for second or foreign language learning. The strategies were drawn from a comprehensive taxonomy of second language learning strategies based on an extensive research review (Oxford, 1986).

In a field test at the Defense Language Institute, a preliminary factor analysis of SILL results produced 10 factors, which were slightly refined and interpreted to yield the factors on which the MBTI-SILL pilot study are based. These factors are as follows:

- General learning strategies for reading and studying
- Authentic language use
- Searching for and communicating meaning
- Independent strategies that can be used without involving anyone else
- Memory strategies (mnemonics)
- Social strategies, involving other people's support
- Affective strategies that relate to dealing with learner's own feelings and attitudes about language learning
- Self-management
- Visualization strategies
- Formal model-building, or constructing one's own model of the structure of the language and revising that model as more information comes in

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5

Attitudes, Motivation, and Personality as Predictors of Success in Foreign Language Learning

R. C. Gardner

At a general level, it seems meaningful to propose that there are four broad categories of variables associated with second language acquisition. Two of them focus on individual differences of the language learner that could influence the extent to which he or she learns the second language. The other two refer to the characteristics of the learning environment, one dealing specifically with the classroom context, and the other with the larger socio-cultural context as it might influence language learning. While language researchers and administrators might focus attention on only the first two categories, it seems obvious that they cannot ignore the other two, because differences in them and interactions between them and the individual difference variables could have a profound effect on individual levels of proficiency.

The first category to be considered is that of *affective variables*. This category refers to those emotional or predispositional characteristics of individuals that influence their perceptions and impressions of the language learning context and thus their reactions to it, and their views of the language itself. Examples of affective variables would be various personality traits, such as, anxiety, sociability, and empathy; attitudinal and motivational attributes; and some types of language learning styles and strategies.

The second category of relevant variables is that of *cognitive variables*. This category refers to those intellectual and verbal skills that individuals bring with them to the language learning situation

that facilitate the acquisition and retention of language material. Examples of cognitive variables would be intelligence, language aptitude, proficiency in the native language, and some types of language learning strategies and learning styles.

Pedagogical variables constitute the third category and refer to those characteristics of the language learning context that are involved in the transmission of material to the language learner. They include various techniques and procedures that instructors use to transmit material to students, instructional materials, teaching aids, and teacher characteristics. Within any given classroom setting, such variables would be constant, though individual students' reactions to them need not be constant, and in fact, various student characteristics may interact with these pedagogical variables. In any event, such variables can be very influential in promoting proficiency in a second language (Stern, 1983), and thus, should not be ignored, particularly in investigations when data from many different classes are merged to form one large sample. The implications of this are discussed in further detail in a subsequent section.

The fourth and final category of variables is comprised of *environmental language-relevant variables*. This refers to the socio-cultural milieu in which language learning takes place, and involves such variables as community-shared beliefs about language learning or about the learning of some specific language, and opportunities to use or experience the language outside the classroom setting. Thus, learning Spanish in California may take place in a much different socio-cultural milieu than in Utah. In either state, there may be very different environmental language-relevant variables involved in learning Russian than in learning Spanish. By considering this class of variables, therefore, researchers can tap into a host of factors that might differentiate one study from another.

It seems obvious that all four classes of variables are involved in second language acquisition, and therefore, that all four classes should be considered when attempting to explain or even predict individual differences in proficiency. In any given classroom environment, however, the latter two classes of variables are relatively constant, thus, when dealing with prediction within a classroom, attention is focused largely on the first two. It should be remembered, however, that the socio-cultural milieu and the classroom

context can play a role, and might even interact with individual difference variables. Carroll (1962) has demonstrated, for example, that pedagogical variables can influence the relationship between proficiency and both aptitude and motivation.

Although a major purpose of this chapter is to discuss the role of personality variables and attitudes and motivation in second language acquisition, some attention also will be directed to language aptitude. This is necessary because it is, after all, a very important factor in the acquisition of another language. Indices of language aptitude are included in many of the studies of attitudes, motivation, and language achievement conducted by the author of this chapter (see, for example, Gardner, 1985a) because it is his view that to omit language aptitude is to ignore a crucial variable. Moreover, including an index of language aptitude provides a useful baseline from which to evaluate the magnitude of association of any other variables with proficiency in a foreign language, as well as determining the extent to which these other variables are related to, or independent of, language aptitude.

This chapter will also address a number of measurement and analytic issues that should be considered when conducting research on individual difference correlates of second language achievement. Although many of them are applicable to research on affective variables, some of them are equally relevant to research directed toward language learning strategies and language aptitude. Those to be considered include the need for adequate measurement of variables, issues of statistical power, conceptual difficulties associated with interpreting regression coefficients, problems that arise from confounding levels of achievement or course-related characteristics by merging classes of students, and the use of measures that confound levels of achievement or self-perceptions of such with measurement of the construct in question.

In discussing the role of individual difference measures of personality, attitudes, and motivation in foreign language acquisition, it seems important to distinguish between common and idiosyncratic individual difference predictor variables. Most people concerned with second language learning know of at least one individual who has developed proficiency in a foreign language because of some particular experience, attribute, or talent. This author once met an

individual who attributed his interest and skill in a foreign language to an accident earlier in his life that resulted in his becoming blind. Such idiosyncratic reasons can be very potent, but they generally are not the ones studied in any investigation. When searching for correlates of second language proficiency, the objective is to identify those "common" variables that on average discriminate between the more successful and less successful language learners. Idiosyncratic causes, as important and powerful as they might be, are essentially sources of error in the typical study in that they tend often to reduce the degree of association between the common predictor variables and achievement.

When considering the host of possible variables that might have idiosyncratic effects on proficiency and the many possible common predictors of proficiency, one very quickly gets the impression that a particularly high level of prediction is unattainable. It is the view of this researcher that our current degree of prediction is close to the maximum we will ever attain, though there are possibly some new predictors that might be considered, and measurement can always be improved.

Much of the research to be discussed in this paper involves school-age children or university students who generally have not yet developed a firm grasp on their future objectives. The primary objective of this publication, however, is to consider potential predictors of second language achievement among adult language learners. A very pertinent question can be raised, therefore, about the extent to which one can generalize results from children to adults. It seems reasonable to argue that the processes are very similar if the learning contexts are the same, and therefore, that the same predictors would be applicable to adults and to children. It even seems possible, particularly in the case of attitudinal/motivational variables, that relationships with achievement would be somewhat more pronounced with adults than with children, because one might expect greater variation in such characteristics in the population of adults. At the same time, it seems equally reasonable that research with adults might yield lower relationships than those obtained with children, partly because of this greater heterogeneity, and partly because of the role of idiosyncratic predictors. In any class of elementary school students, it is probable that their prior

experiences, attitudes, and motivations will have common roots, whereas in adults there is greater room for the operation of idiosyncratic predictors and the possibility of interactions between predictors that might moderate simple bivariate relationships.

A major point to be emphasized in this chapter is that, rather than be concerned with identifying predictors of proficiency, researchers direct themselves to understanding the processes underlying foreign language acquisition. By emphasizing process over prediction, it is argued that researchers will better appreciate those variables that influence differences in achievement, and will in turn be able not only to predict achievement, but also to effect differences in achievement by modifying the learning context, materials, and methods to take advantage of the roles played by the individual difference variables.

Much of the research to be reviewed here focuses on the degree of correlation between a given variable or class of variables and proficiency in the other language. Thus, the basic data are associational. A position adopted in this chapter, however, is that at times it is possible and meaningful to go one step further and suggest that the most appropriate way to interpret many of these correlations is in terms of the variable in question facilitating the development of proficiency. This type of causal model is largely interpretative and is based on ancillary data and the particular correlation given. Researchers must always heed the validity of the proposition that "correlation does not mean causation," however, they should also recognize that "causes" can be reflected in correlation. Thus, where understanding is facilitated by such causal interpretations, they should be made — with the realization that they are hunches that require continual verification and testing. Moreover, such causal statements represent an obvious over-simplification. When it is proposed, for example, that motivation causes achievement, what is really implied is that in the particular learning context, individual differences in motivation are associated with individual differences in achievement, and it is reasonable to argue that the motivation is responsible for the achievement. The reasons for this may be many. Highly motivated individuals may try harder, work longer hours, process material more efficiently, and find the acquisition of the material more reinforcing than those who are less motivated. Each

of these alternatives is itself testable, and identifying the dominant one could have implications for student selection, teacher practice, and the like. It is not simply that "motivation causes achievement." And, of course, the causal sequence can be reciprocal (cf. Gardner, 1988).

Personality Correlates

There are, surprisingly, relatively few studies that have considered the relationship between personality variables and achievement in a second language. In a recently prepared annotated bibliography of studies, published between 1984 and 1987, that deal with aptitude and intelligence, attitudes and motivation, language learning strategies and personality correlates of second language achievement, Galbraith and Gardner (1988) presented 22 studies that look at personality out of a total of 64 articles. Of the 22, 17 studies considered personality in conjunction with attitudes and motivation. Thus, there has not been much research directed solely to personality correlates of second language proficiency. Two reasons for this might be (a) the generally poor results that have been obtained in the studies that have been conducted, and (b) the lack of any clear theoretical model for expecting a link between personality and foreign language proficiency.

To indicate the nature of the low associations between personality variables and achievement in a second language, it is instructive to focus attention on data from a study by Lalonde and Gardner (1984). This study considered not only a number of personality variables and their relation to second language achievement, but also the relationship of these measures to attitudinal/motivational attributes and language aptitude. Table 1 presents a summary of the correlations obtained between 19 personality measures and an aggregate measure of French achievement assessing listening comprehension, vocabulary, grammar, and written production. The table also presents correlations between the personality variables and total Can-D (Clark, 1981) self-ratings of French speaking, reading, and comprehension skills and the short form of the Modern Language Aptitude Test (MLAT), (Carroll and Sapon, 1959), composite measures of Integrativeness, Attitudes toward the Learning

Table 1
Correlations of Personality Variables with Second Language Achievement and Related Predictors

	Total Achiev.	Cando Ratings	MLAT	Integra-tiveness	Motivation	Attitude/ Learning Situation	French Class Anxiety
n Achievement	.03	.06	.10	.43**	.41**	.16	.06
n Aggression	.06	.08	.00	.19	-.25*	-.30**	-.28**
Anxiety	-.08	-.03	-.14	-.09	-.04	.08	.26*
Breadth of Interest	-.18	.01	.09	.40**	.23*	.14	.00
Complexity	-.16	-.12	.08	.37**	.08	-.08	.11
Conformity	-.03	-.12	-.15	-.27*	-.15	-.04	.24*
Energy Level	-.12	.07	.08	.18	.17	.03	-.08
n Impulsivity	.00	-.15	-.09	-.26*	-.31**	-.15	.07
Innovation	-.36**	-.12	.00	.18	.14	-.05	.14
Interpersonal Affect	-.16	-.11	.12	.20	.14	.01	.20
Organization	.18	.41**	-.13	.24*	.40**	.23*	-.13
Responsibility	-.09	.07	.17	.31**	.37**	.18	-.04
Risk Taking	-.07	.01	-.12	-.17	-.15	-.29**	-.23*
Self Esteem	-.13	.24*	.08	.23*	.26*	.02	-.37**
Social Adroitness	.15	.15	.09	.08	.10	.11	-.24*
Social Desirability	.06	.17	.18	.42**	.50**	.22*	-.06
Social Participation	.02	-.12	.11	-.12	-.04	.11	-.05
Tolerance	-.02	-.11	.17	.14	.11	.02	-.05
Value Orthodoxy	-.10	.09	-.13	.09	.18	.20	-.10

All personality measures with the exception of need Achievement, need Aggression, need Impulsivity, and need Social Desirability were based on the Jackson Personality Inventory (Jackson, 1976). These other measures were adapted from the Personality Research Form (Jackson, 1974).

* $p < .05$
** $p < .01$

Situation, Motivation (see descriptions in the section on Attitudes and Motivation), and French Class Anxiety. The 88 subjects for this investigation were university students studying French as a second language.

As can be seen in Table 1, there is very little relationship between any of the personality variables and language aptitude, French achievement, or self-ratings of French proficiency. None of the correlations with language aptitude is significant, suggesting that language aptitude is relatively independent of these personality characteristics. Such independence should be anticipated, of course, because there is no reason to expect that individuals high on any given personality characteristic would tend also to have high or low levels of language aptitude.

Only one personality variable, innovation, correlated significantly with the objective indices of French achievement, and this correlation was negative, suggesting that subjects high on innovation (or creativity) tend to have lower levels of French proficiency than individuals who are less creative. Similar results have been reported by Chastain (1975), who found significant negative correlations between a total creativity score and grades in French and German (but not Spanish). Such negative relationships might reflect the nature of the indices of achievement used. In the present study, they were largely simple production measures, or identifications of the correct response. Perhaps scores on such measures are high for those low in creativity. If the measures of French proficiency had been somewhat more complex, requiring some type of scholarly essay or the listing of unique uses for objects, they might conceivably correlate positively with creativity. In his study, Chastain (1975) concludes that perhaps some types of creativity would have beneficial effects, while others could negatively influence learning of a second language.

Only two personality measures correlated with the Cando (Clark, 1981) self-ratings of French proficiency. Subjects high in both organization and self-esteem rate their proficiency to be higher than that of subjects who are low on either attribute. That is, individuals who are efficient and systematic, and those who are self-assured and confident perceive their skills in French to be relatively good.

There are a number of significant correlations between the person-

ality measures and the aggregate indices of integrativeness, attitudes toward the learning situation, and motivation and the measure of French class anxiety. Examination of Table 1 will indicate, furthermore, that by and large the significant correlations tend to make intuitive sense. For example, it is reasonable to expect that individuals high in need for achievement would exhibit high levels of motivation to learn French, or that individuals high in need for aggression would have relatively low levels of evaluation of the learning situation. Based on this study, therefore, it seems reasonable to conclude that there are few solid links between personality characteristics and achievement in a second language, though there are between personality attributes and attitudinal/motivational variables.

Some of the personality traits referred to in this study have also been investigated in other studies with similar results. One attribute that has received much interest is that of sociability or extraversion (cf. social participation in this study). Other researchers have demonstrated positive correlations between sociability and grades in German and Spanish (but not French), (Chastain, 1975), positive correlations with ratings of French fluency (Pritchard, 1952), and a negative association with French proficiency once ability was controlled (Smart, Elton, & Burnett, 1970). Such apparent inconsistencies are evident even in individuals' perceptions of "good language learners." Vallette (1964), for example, suggests that sociable and outgoing children are good learners, but for adolescents and adults, the opposite is true. Dunkel (1947) felt that introverts (presumably less sociable individuals) would be more successful than extraverts. Kawcyznski (1951), on the other hand, suggests that the nature of the language course would determine whether extraverted students outperformed introverted students or vice versa. Such views also seem to be reflected in teachers' perceptions of good language learners. Naiman, Fröhlich, and Stern (1975) report that both introversion and extraversion are seen by teachers as characteristics of successful students. In the Lalonde and Gardner (1984) study, social participation (or sociability) failed to correlate significantly with the indices of second language achievement, contributing once again to the general ambiguity.

Another variable that has been postulated as being important is

that of empathy. Individuals who are sensitive to the feelings of others would be expected to recognize unique characteristics in the other language, and thus, acquire it more readily than those who are less sensitive. Most of the research on this construct has been conducted by Guiora and his colleagues, and, although the notion is appealing, the results are not compelling. The most positive results were obtained in one of the earlier studies (Guiora, Lane, & Bosworth, 1967) that demonstrated a substantial correlation between empathy, as assessed by scores on the Micro-Momentary Expression (MME) test, and ratings of the accuracy of French pronunciation of French teachers. However, in an investigation of university students' ability to mimic spontaneous Japanese speech after some brief training, Taylor, Catford, Guiora, and Lane (1971) obtained only 10 significant correlations of proficiency with empathy measures. Nine of these were negative, contrary to predictions. Similarly, Guiora, Brannon, and Dull (1972) investigated the relationship of empathy to authenticity of pronunciation of students in classes in Japanese, Mandarin Chinese, Thai, Spanish, and Russian. Measures of empathy derived from the MME correlated positively with the pronunciation scores for students of Spanish, Japanese, and Russian, but negatively for students of Thai and Chinese. Although it is conceivable that these differing correlational patterns could be meaningful, they make any interpretation rather difficult. One possibility (cf. Schumann, 1975) is that the MME may be an inappropriate or unreliable measure of empathy.

Attempts to relate empathy and related constructs to proficiency, however, have been similarly disappointing. Naiman, Fröhlich, Stern, and Todesco (1978) obtained no significant correlations between a measure of empathy and achievement in French, whereas Gardner and Lambert (1972) found no significant correlations between their measure of sensitivity to others and French proficiency. The measure was, however, related to indices of motivation. Although direct measures of empathy were not used in the Lalonde and Gardner (1984) study, the personality measures of interpersonal affect and tolerance are conceptually similar. The measures of n aggression, n impulsivity, and value orthodoxy are somewhat antithetical. As can be seen in Table 1, none of these measures correlated significantly with either the objective measures of French profi-

ciency or the Cando self-ratings, though some of them did relate significantly to some of the attitudinal/motivational indices. In general, therefore, there is not strong support for a pivotal role for empathy in the language learning context, despite its intuitive appeal.

Another variable that has been considered in a number of studies is that of field dependence/independence. Field dependent individuals presumably are influenced by their environment and tend to be sensitive and interested in others. Field independent individuals, on the other hand, distinguish between figure and ground, and tend to be self-sufficient and analytical. Naiman, Fröhlich, Stern, and Todesco (1978) proposed that field-independent individuals would be successful language learners because they would distinguish between important elements to be learned and other less relevant background factors. In support of this, they found positive correlations between field independence and measures of French oral production and listening comprehension among university language students. Significant relationships were also obtained by Tucker, Hamayan, and Genesee (1976) between field independence and general French achievement among seventh-grade students, while Genesee and Hamayan (1980) reported positive relations for first- grade students. Contrasting results were reported by Bialystok and Fröhlich (1977) who failed to find any significant correlations between field independence and French reading comprehension among students in ninth or tenth grade. Finally, research involving adult subjects has tended to yield positive results. Hansen and Stansfield (1981) found positive relationships between field independence and various indices of second language proficiency among university students studying Spanish; Chapelle and Roberts (1986) found that field independence accounted for a significant proportion of variance in second language achievement. D'Anglejan and Renaud (1985) reported that field independence was a significant predictor of French proficiency among adult immigrants in intensive language training.

The Hansen and Stansfield (1981) study is particularly informative, however, because the researchers also found that if the effects of scholastic ability were partialled out of the correlations between field independence and second language proficiency, all but one of

the correlations (that involving the Cloze test) were no longer significant. This seems particularly important because the measure of field dependence/independence that is typically used is the Embedded Figures Test, which has been shown to correlate with indices of reasoning skills (cf. Genesee and Hamayan, 1980). Thus, its interpretation is potentially equivocal.

The Lalonde and Gardner (1984) study, summarized in Table 1, did not include any measure of field dependence/independence, but the measures of breadth of interest, complexity, and conformity are conceptually similar to aspects of field dependence/independence that have been hypothesized to account for the relationships obtained. It will be noted in Table 1 that none of these measures relates significantly to second language proficiency, although they do relate to some attitudinal/motivational characteristics. It seems meaningful to conclude from this review, therefore, that, although field independence might predict subsequent success in a second language, the interpretation underlying this prediction may not be clear cut.

A final personality variable to be considered is that of anxiety. In his review of research, Scovel (1978) concluded that the findings concerning any relationship between anxiety and second language learning were very inconsistent. This conclusion was based largely on his review of four studies. In two of them (Swain & Burnaby, 1976; Tucker, Hamayan, & Genesee, 1976), significant negative correlations were obtained between indices of anxiety and some measures of second language proficiency, but correlations with other measures of achievement were not significant. In another study (Chastain, 1975), a measure of test anxiety had a negative correlation with proficiency in an audio-lingual French course, a positive correlation with grades in Spanish, and non-significant correlations with grades in regular French and German courses. Other measures of anxiety did not correlate significantly with these indices of proficiency. A fourth study was concerned with the relation of anxiety to the avoidance of certain second language forms. In that study, Kleinmann (1977) found that facilitating anxiety was positively related to the use of difficult linguistic structures in English by Arabic students, while a measure of debilitating anxiety failed to show the anticipated negative correlations. Scovel (1978), nonetheless, felt

that the notion of two anxieties, one debilitating, the other facilitating, would help to explain the somewhat inconsistent findings.

Since 1978, considerable research has been conducted on the role of anxiety in second language learning. A recent annotated bibliography (MacIntyre & Gardner, 1988) contains references to 35 articles that were either directly concerned with the role of anxiety in second language learning or that at least included one or two measures of anxiety among a set of other variables. Twenty-four of these have been published since 1978. In general, these studies yield comparable findings. General measures of anxiety such as trait anxiety, test anxiety, and manifest anxiety tend to correlate inconsistently with measures of proficiency in a second language. A similar result is evident in Table 1, where it will be noted that the measure of anxiety does not correlate significantly with either the objective index of French proficiency or the Cando (Clark, 1981) self-ratings. Note, however, that the measure of anxiety does correlate significantly, though not highly, with the index of French class anxiety.

In contrast with these inconsistent links between general forms of anxiety and achievement in a second language, this recent research has demonstrated that measures of anxiety that involve the learning or use of a second language do correlate negatively, and fairly substantially so, with indices of achievement in a second language (see, for example, Clément, Gardner, & Smythe, 1980; Horwitz, 1986). Clément and his colleagues have, in fact, proposed a concept of self-confidence with the second language (that includes an absence of anxiety about the language) (Clément, 1987; Clément & Kruidenier, 1985; Labrie & Clément, 1986).

There are at least three different measures of anxiety that focus on a second language: the French class anxiety scale (Gardner & Smythe, 1976), the English use anxiety scale (Clément, 1976), and the foreign language classroom anxiety scale (Horwitz, Horwitz, & Cope, 1986). Each of these scales tends to produce fairly substantial negative correlations with proficiency in the corresponding second language (see MacIntyre & Gardner, 1988). These types of results conflict somewhat with the much lower and inconsistent correlations involving general anxiety measure, and the reason would seem to lie in the specificity of the anxiety involved. That is, it is reasonable to assume that anxiety, in and of itself, does not influence second

language learning to any great extent, whereas anxiety concerning the second language could have a profound effect. It seems quite likely that individuals who are generally anxious would tend also to be anxious in the language class. However, because of various factors operating in the language class, many such individuals might develop strategies for coping with their anxiety. Furthermore, there are undoubtedly other individuals who may not be generally anxious, but because of experiences in the language class, they might develop anxiety about their performance. Thus, for example, a trait of classroom anxiety may be developed, which shares only limited variance in common with a trait of generalized anxiety.

This type of interpretation is consistent with research conducted recently. In one such study, Gardner, Moorcroft, and MacIntyre (1987) were concerned with anxiety correlates of oral French language proficiency among university students who had stopped studying French. They found that measures of French class anxiety and French use anxiety correlated negatively with the ability to produce French vocabulary under constraints as to topic, whereas general measures of anxiety, and even indices of state anxiety (Spielberger, 1966), did not correlate with proficiency. That is, a trait of language anxiety did appear to influence performance, whereas general anxiety and even anxiety in the situation did not. In a subsequent study, MacIntyre (1988) demonstrated that French Class and French Use anxiety were the main correlates of the ability to learn French words in a vocabulary-learning situation, whereas general anxiety, state anxiety, and other indices of anxiety generally did not correlate with achievement.

These findings with respect to anxiety seem particularly relevant to the entire issue of personality correlates of second language proficiency. That is, it seems unlikely that personality characteristics in and of themselves will play much of a role in second language learning unless these particular traits become associated directly with the language itself. Thus, the personality trait of risk-taking probably would not relate to achievement in a second language, but the willingness to take risks with the language undoubtedly would be related (cf. Beebe, 1983). Similarly, the extravert (or very sociable individual, etc.) may not necessarily learn languages quickly, but the individual who is outgoing with the second language will quite

likely be successful. It would seem, therefore, that refocusing personality characteristics so that they relate directly to the language being learned (e.g., risk-taking with language material) will improve both the understanding of such affective variables in second language learning and the prediction of achievement in the language.

This type of refocusing seems to be precisely what is taking place in the relatively new area of language learning strategies. As indicated earlier, some forms of language learning strategies can be viewed as cognitive types of variables in that they involve using intellectual or cognitive techniques to promote language learning (cf. Bialystok & Fröhlich's [1977] notion of inference, or Oxford's [1986] L1 to L2 strategies). Other strategies, however, can be classed as affective variables in that they involve personality-based or social behaviors. Thus, Rubin's (1975) notion of lack of inhibition or Oxford's (1986) affective strategies refer to a link between specific personality attributes and second language proficiency. Viewed as strategies, however, these personality attributes are assessed so that they are directly linked with second language material. In this format, it would be expected that they would correlate more highly and more consistently with achievement in the second language than they would if they were assessed simply as personality attributes.

Attitudes and Motivation

One thing that distinguishes the concept of attitudes and motivation in second language acquisition from that of personality variables is that the various attitudinal and motivational attributes investigated are linked to the language under study. When considering attitudinal variables, Gardner (1985a) proposed that they could be arranged along a continuum varying from specific to general. Variables such as attitudes toward learning the language could be viewed as relatively specific, while attributes such as ethnocentrism could be viewed as much more generally applicable to language learning. Measures such as attitudes toward the language teacher and the other language community would lie somewhere in between. Gardner (1985a) demonstrated, in fact, that the

mean correlations of various attitude measures with achievement varied as a function of their assumed specificity to the language.

Much of the research in this area has been conducted with elementary- and secondary-school-aged children, with some studies being done with university-aged students. This research is summarized in fairly detailed fashion by Gardner (1985a), and some articles (see, for example, Gardner, Smythe, Clément, & Gliksman, 1976; Gardner, 1980; and Lalonde & Gardner, 1985) present summaries of statistics derived from many studies. Table 2, adapted from Gardner (1980), presents a set of correlations involving the attitude/motivation index, the MLAT, and grades in French for 29 samples of elementary- and secondary- school students studying French as a second language in various areas across Canada. Three points stand out in the table. First, the sets of correlations for both the MLAT and AMI with grades tend to be reasonably high and generally significant. In seven instances, AMI correlates more highly with grades than does the MLAT, and twice they are the same, but in the remaining 20 sets, the MLAT outperforms AMI. Second, AMI and the MLAT tend to be relatively independent. Eleven of the correlations between them are significant, but by and large they are quite low— the median is only .13. Finally, in terms of the median correlations, AMI tends to account for approximately 14% of the variance in grades in French (.37 squared) while the MLAT accounts for about 17% (.41 squared). Together they account for roughly 27% (.52 squared).

The AMI is viewed largely as comprising three main components: integrativeness, attitudes toward the learning situation, and motivation. Integrativeness involves a complex of attitudes toward the other language group(s), a desire to learn the other language in order to interact with members of that group, and a general interest in other languages and other groups. Attitudes toward the learning situation refer to attitudes toward the language learning context, assessed primarily in terms of affective reactions toward the course and the teacher. Motivation, the third component, involves a three-part conceptualization of motivation reflecting a desire to learn the language, effort expended toward learning the language, and favorable attitudes toward learning the language. Each element of motivation, in and of itself, is not viewed as sufficient to characterize a motivated individual, whereas the totality of the three would seem

Table 2
Correlations of AMI and MLAT
with French Grades

	AMI x Grades	MLAT x Grades	AMI x MLAT	Multiple Correlation
Area 1				
Gr 8	.37**	.44**	.06	.56
9	.46**	.30**	.21*	.51
10	.42**	.43**	.04	.59
11	.43**	.59**	.23*	.66
Area 2				
Gr 7	.37**	.49**	.19**	.57
8	.40**	.56**	.27**	.62
9	.36**	.50**	.28**	.55
10	.24**	.46**	.14*	.49
11	.42**	.23**	.16*	.45
Area 3				
Gr 7	.43**	.19*	.00	.47
8	.29**	.55**	-.01	.62
9	.42**	.46**	.19*	.57
10	.43**	.42**	.15	.56
11	.15	.50**	.05	.52
Area 4				
Gr 7	.34**	.24**	.09	.40
8	.32**	.32**	.15	.42
9	.38**	.40**	.17*	.51
10	.28**	.41**	-.04	.51
11	.45**	.48**	.20*	.60

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Table 2 Continued

Area 5				
Gr 9	.29**	.46**	.13	.52
10	.47**	.38**	.04	.59
11	.35**	.39**	-.03	.52
Area 6				
Gr 7	.31**	.33**	.09	.43
8	.30*	.37**	-.06	.49
9	.20	.38*	.33**	.39
10	.26*	.26*	-.04	.38
11	.44**	.21*	.09	.47
Area 7				
Gr 10	.50**	.55**	.14	.70
11	.23**	.27**	.04	.35
Median	.37	.41	.13	.52

* $p < .05$
** $p < .01$

to do so.

Lalonde and Gardner (1985) investigated the correlation of each of the components—integrativeness, attitudes toward the learning situation, and motivation—with three different criteria of language achievement: grades in French, objective measures of French proficiency, and the behavioral intention to continue French study. The data were derived from a total of 39 samples of students enrolled in French from grade 7 to grade 11, varying in size from 38 students to 226 students. For all three criteria, the index of motivation was the highest correlate (median correlations = .39, .30, and .57 for French grades, achievement, and behavioral intention respectively), and the mean correlations were significantly higher than either of the other two components. The average correlations for the other two components did not differ significantly from each other for either behavioral intention or French grades, but integrativeness had a significantly higher mean correlation with the objective index of achievement than did attitudes toward the learning situation. Such results are consistent with the specificity notion mentioned earlier, and moreover, indicate that the motivational component is the best predictor of subsequent achievement.

Although much less research has been conducted with adult subjects, those studies that have been conducted with university-level students, at least, tend to confirm the general finding that attitudes and motivation are involved in second language learning with adults. In two studies, for example, Gliksman (1981) demonstrated that attitudinal/motivational attributes were related to indices of achievement in a second language, and that a general AMI index was a better predictor overall of a number of criteria of second language proficiency (e.g., grades, objective measures, intention to continue French study) than were measures derived from Ajzen and Fishbein (1977) that assessed attitudes toward the specific act (e.g., getting good grades in French). As might be expected, however, the specific attitude tended to be a better predictor of the specific act than was the AMI. In the Lalonde and Gardner (1984) study mentioned earlier, also conducted with university students, indices of motivation and language aptitude were more closely associated with second language achievement in a causal sense than were integrativeness, attitudes toward the learning situation, or various person-

ality characteristics. Finally, a study conducted by Gardner, Lalonde, and Moorcroft (1985) demonstrated that both the MLAT and AMI interacted with trials in a paired associates task in which students learned the English equivalents of rare French words. Both interactions were similar in that on Trial 1, both subjects who were high and those who were low on either AMI or MLAT were comparable in terms of the number correct, but the rate of learning was steeper for those who were high than for those who were low. This study demonstrated, therefore, that both attitudinal/motivational attributes and language aptitude influence the rate of learning second language material. Other results obtained in the study suggested that AMI influenced the rate of learning largely because subjects with high levels of AMI worked harder than those with low levels. Motivation levels did not vary as a function of the MLAT, however, suggesting that aptitude influences rate of learning because subjects with higher levels of ability profit more from a given unit of training.

This is not meant to imply that all studies demonstrate significant correlations between attitudinal/motivational attributes and second language achievement, just as all studies do not show that language aptitude correlates significantly with proficiency in a second language. Gardner (1985a) describes some studies that fail to find significant correlations between attitudinal/motivational characteristics and second language achievement, and also discusses factors, over and above Type II errors, that could produce such "null" results. Some of these factors are described in the following section on measurement and analytic issues. Two important factors, however, are the reliability and validity of the measures under consideration.

Most researchers concerned with assessing the role of attitudes and motivation in second language learning have been concerned with the issue of reliability of the attitude and motivation measures. Relevant publications (see, for example, Clément, 1976; Gardner, Lalonde, & Moorcraft, 1985; Gliksman, 1981, etc.) invariably provide estimates of reliability for each measure. Gardner (1985b) presents Cronbach internal consistency reliability coefficients and test/retest reliabilities for the nine attitude and motivation measures typically used in much of this research. The internal consistency reliabilities

are based on 32 samples of students in grades 7 to 11 in seven different regions across Canada, and the test/retest reliabilities are derived from 18 samples drawn from four of these regions. The time interval for these latter coefficients was approximately one year so it is quite possible that the coefficients are deflated because of actual changes in the attributes being measured. In general, however, the reliability coefficients are very reasonable. The median internal consistency and test/retest reliabilities respectively for each measure were as follows: Interest in Foreign Languages (.86, .58), attitudes toward French Canadians (.87, .60), integrative orientation (.82, .56), French teacher evaluation (.91, .36), French course evaluation (.95, .56), attitudes toward learning French (.94, .67), motivational intensity (.82, .64), desire to learn French (.86, .66), and instrumental orientation (.62, .48). Taken together, these two different estimates of reliability warrant the conclusion that the measures provide relatively error free estimates.

As can be seen, the measure of instrumental orientation has relatively low reliability coefficients. It is not, however, part of the three components—integrativeness, attitudes toward the learning situation, and motivation—discussed earlier, the elements of which are fairly reliable. The general unreliability of instrumental orientation probably results from the heterogeneous collection of reasons for learning French that are subject to change over time. Thus, it is quite reasonable that both types of reliability are low. The low test/retest reliability for the measure of French teacher evaluation, furthermore, quite probably reflects the fact that the teacher rated the first time was invariably not the same teacher rated the second time, because the students were then in different classes.

Attention has been paid to the issue of validity, though with self-report measures this can be problematic. Questions concerning the validity of the attitude and motivation measures have been raised by Oller and Perkins (1978), Oller (1982), and Au (1988), and material and issues relevant to these criticisms have been provided by Gardner (1980), Gardner and Gliksman (1982), and Gardner (1988). The simplest and most basic way of assessing validity is in terms of face validity, wherein the items appear to measure the construct of interest, and in this respect the measures clearly have validity. A somewhat better index of validity is to determine whether the test in

question correlates highly with another test measuring the same construct. This approach was used by Gardner, Lalonde, and Moorcraft (1985) for six of the measures referred to above (motivational intensity, French teacher evaluation, and French course evaluation were not included) and for some others. For each of the six measures, the correlation was higher with the Guilford (1954) version of the same measure than it was for measures of different constructs. Such results again support the proposition that the various indices of attitudes and motivation are valid measures of the constructs in question. Finally, indices of construct validity, as indicated by various causal modelling studies (e.g., Gardner, Lalonde, & Pierson, 1983), also attest to the validity of the various measures, whereas much of the material presented in this article (see also Gardner, 1985a) demonstrates the general predictive validity of the measures taken as a group.

Table 2 (adapted from Gardner, 1985b) presents information relevant to the predictive validity of both the MLAT and AMI for the seven regions in Canada. Generally speaking, the correlations are slightly higher for the MLAT than they are for AMI, and this would be expected. For two of these areas, information also was available on the students' academic averages (excluding French). With this information it was possible to determine how the MLAT and AMI correlated with proficiency in French once the variation attributable to general academic performance was removed. Table 3, also adapted from Gardner (1985b), presents the relevant correlations obtained in two of these areas for proficiency assessed in terms of French grades and also in terms of objective measures of French achievement. As can be seen in Table 3, the MLAT tends to correlate more highly with both criteria than does AMI. However, when the partial correlations removing variability attributed to general academic ability are considered, the validity coefficients are comparable. The reason for this can be seen in the correlations of these predictors with academic average. In 9 out of 10 cases, the correlations between the MLAT and Academic Average are significant, whereas only one of the correlations between AMI and Academic Average is significant. Thus, although both MLAT and AMI evidence reasonable levels of convergent validity, only AMI demonstrates discriminant validity.

As with personality measures, not all studies concerned with the

Table 3
Correlations of AMI and MLAT with French Grades and Objective Measures with Academic Average Partialed Out

Correlations with AMI

	Academic Average	French Grades	Partial	Objective Measures	Partial
Area 2					
Gr 7	.32**	.37**	.21*	.36**	.27**
8	.13	.40**	.45**	.37**	.35**
9	.15	.36**	.34**	.07	.02
10	.07	.24**	.23*	.19**	.19**
11	-.03	.42**	.43**	.49**	.50**
Area 7					
Gr 7	.17	.31**	.27*	.31**	.29**
8	.00	.30**	.34**	.27**	.27**
9	.24	.20	.08	.16	.10
10	.10	.26*	.24	.26*	.25
11	-.03	.44**	.57**	.14	.16
Medians		.34	.31	.27	.22

Table 3 Continued
Correlations with MLAT

	Academic Average	French Grades	Partial	Objective Measures	Partial
Area 2					
Gr 7	.48**	.49**	.23**	.27**	.11
8	.52**	.56**	.31**	.44**	.28**
9	.54**	.50**	.27**	.44**	.33**
10	.25**	.46**	.42**	.44**	.44**
11	.26**	.23**	.21**	.43**	.41**
Area 7					
Gr 7	.44**	.33**	.07	.13	.06
8	.41**	.37**	.21	.33**	.30*
9	.36**	.38**	.23	-.10	-.21
10	.22	.26*	.21	.17	.15
11	.25*	.21*	.08	.19	.10
Medians		.38	.22	.30	.22

correlation of attitude/motivation measures with indices of proficiency report significant correlations. This is even evident in Tables 2 and 3 where some of the correlations between AMI and French grades or objective measures of French proficiency are not significant. Moreover, some of the correlations between the objective measures and the MLAT are not significant. Examination of Tables 2 and 3 also shows that in some areas the correlations tend, on average, to be higher than in others. Even within areas, from grade to grade the correlations vary, and it is not clear that this variation can consistently be attributed to grade level. Thus, it seems quite likely that other factors operating in the community or in the classroom could be influencing the degree of relationship obtained. Furthermore, some researchers report results that are either inconsistent or contradictory (see, for example, Chihara & Oller, 1978; Oller, Baca, & Vigil, 1977; Teitelbaum, Edwards & Hudson, 1975). Gardner (1985a) has argued that some of the inconsistent findings can be attributed to measurement or analytic difficulties, but it would nonetheless be expected that factors operating in the environment could moderate the role played by attitudes and motivation.

Gardner (1985a) has argued that the socio-cultural milieu and the classroom environment could influence the role played by attitudes and motivation in second language learning, and that language aptitude and motivation are probably the major individual difference variables influencing the acquisition of a second language. This proposition is based on earlier formulations (e.g., Gardner & Lambert, 1972; Lambert, 1963, 1967, 1974, 1980) and considerable supporting data. The model is somewhat expanded, however, in that it links the variables to underlying processes. Language aptitude is presumably important to second language learning because it provides a cognitive foundation. Individuals with high levels of language aptitude have a good foundation in their own language that they can generalize to the new language, have good memories for speech sounds and form, and have well-developed reasoning skills (cf. Carroll, 1974; Gardner & Lambert, 1965). Individuals with high levels of motivation want to learn the language, work hard at doing so, and find the activity rewarding.

Although there are undoubtedly some exceptions, by and large, people who are highly motivated to learn the language are inter-

ested in making contacts with the other language community, have favorable attitudes toward the community, are probably interested in other languages as well, and evaluate the learning context positively. Gardner (1985a) argues that these various attitudinal components serve as the foundation for the motivation, which otherwise would tend to wane in the lengthy process of developing sufficient proficiency in the language to use it for anything other than rudimentary communication.

The configuration of a set of the majority of these variables is often referred to as an integrative motive, to emphasize the notion that many of these variables are important to foreign language learning because they reflect an openness or willingness to adopt the language of another ethnic group. This is not meant to imply that an integrative motive is the only motivational form that will promote the learning of another language. It is, however, one that has shown relationships to achievement in a foreign language fairly consistently.

Much of this research in which such relationships have been obtained was conducted in elementary and secondary schools and in universities, and it is an open empirical question whether they would generalize to other contexts involving adults. For example, it is interesting to speculate whether an integrative motive would be relevant in a context where military personnel were acquiring the language of an enemy group or potential enemy group. It seems meaningful to argue that individual differences in motivation will influence proficiency, and only tightly conducted research will permit one to identify those variables that might influence motivation. It is even possible that differences in integrativeness may have an effect in military contexts, but perhaps rather than arguing that an open orientation promotes proficiency, one might suspect that a closed, suspicious hostility might be detrimental. The net effect is the same, nonetheless: a positive correlation between attitudinal/motivational variables and achievement in the foreign language.

There is considerable support for such a formulation of motivation, over and above the correlations between attitudinal/motivational measures and second language proficiency. Individuals who evidence such motivational characteristics tend to be more active in language class (Gliksman, Gardner, & Smythe, 1982; Naiman,

Fröhlich, Stern, & Todesco, 1978), tend to continue language study in subsequent years as opposed to dropping out (Bartley, 1969, 1970; Clément, Smythe, & Gardner, 1978), and tend to participate more in voluntary excursions to the other language community (Desrochers, 1977). It even seems quite likely that attitudinal/motivational variables could influence the extent to which individuals make use of various language learning strategies. Oxford (1986) has developed a questionnaire that identifies various strategies that individuals can use to aid in the acquisition of second language skills, and Oxford, Nyikos, and Crookall (1987) have isolated at least five major dimensions of strategies. A very reasonable hypothesis suggested by the characterization of motivation as described here is that it could influence whether individuals adopt given strategies. Some research has been conducted that demonstrates an association between motivation and the use of language learning strategies (e.g., Politzer, 1983; Politzer & McGroarty, 1985), but more research would seem to be extremely beneficial. Such research would help to distinguish between the motivational advantages of using strategies and the more fully cognitive advantages. It would also aid in elaborating in a very interesting dimension other implications of the underlying motivational model.

Explicit tests of this model using LISREL causal modelling procedures (Jöreskog & Sörbom, 1984) have also provided good levels of fit (see Gardner, 1985a). The basic model views language aptitude and motivation as the major individual difference variables that promote achievement in the second language and considers the two attitudinal components, integrativeness and attitudes toward the learning situation, as being major "determinants" of motivation. As indicated above, this total configuration of attitudes and motivation is often referred to as an integrative motive (see Gardner, 1985a). Models using this basic configuration, sometimes with additional components, evidence significant measurement and structural coefficients and good levels of fit to the underlying correlation matrices, thus reflecting the validity of this theory.

Although the bulk of the research on attitudes and motivation has been conducted with elementary- and secondary-school children, those studies conducted with university students tend to yield similar results. In fact, two of the causal modelling studies referred

to above (see Gardner, Lalonde, & Pierson, 1983; Lalonde & Gardner, 1984) used university students, and tended to support the model. Obviously, however, more research is needed with adult samples so that the validity of the proposition that attitudes and motivation play an important role in second language learning can be established firmly in these populations.

As indicated earlier, there is very good reason to believe that both attitudes and motivation could play an even greater role in adult second language learning than in that for children. Simply because they have lived longer, adults have had time to develop a stronger sense of self-identity, one very important element of which is their own language. Thus, when faced with the task of learning a second language, they must modify their perceptions of self to some extent. Furthermore, because of their age, they are used to communicating at a relatively complex level, but in the second language context, adults often find that their language skills do not match their cognitive development. This can produce frustration, and, if adult learners are not highly motivated to learn the language, they might well search for some means of escape. If, moreover, they have other pressures operating on them from family, business, or other sources, there is a reasonable chance that they might withdraw from the program, or at least not do as well as they might otherwise.

An open empirical question is whether the attitudinal components—integrativeness and attitudes toward the learning situation—would operate in all adult contexts (e.g., a military language learning program). In all probability, they would, because of the link between language and self-identity as described above (see also Lett & O'Mara, this volume). This does not, however, rule out other motivational components. Although considerable research indicates that an integrative motive facilitates language learning, there really is no reason why other factors could not provide the foundation for the motivation to learn a second language. What is required is research to determine these other motivational factors, and the situations in which they operate.

Although it seems reasonable that motivational and attitudinal components would play an even greater role in adult second language learning than in children's, it seems equally reasonable to predict that demonstrating the relationships between attitudinal/

motivational factors and proficiency in the other language might be even more difficult with adult samples. By and large, any class of elementary-school children is relatively homogeneous in terms of prior experiences, and though experiences may become somewhat more varied in higher grades, they can be much more diverse in a language program from adults from all walks of life. Adult samples can be very heterogeneous in terms of experiences with the target language or cognate languages, and with a host of other relevant factors. These factors could interact with motivational characteristics to influence proficiency. Moreover, these factors might also be confounded with measures of proficiency. These, in turn, could have an effect on correlations obtained in any investigation. Because of this, research concerned with individual difference correlates of proficiency in adult samples should be planned carefully to ensure that potential relationships are not hidden or exaggerated by such external factors.

The next section briefly outlines five measurement and analytic issues that should be considered in this type of research. Some of them may be more applicable to research with adult samples than with others, and most of them perhaps pertain more to studies involving affective variables and other self-report indices than they do to those focusing on language aptitude. They are nonetheless factors that could influence the results of studies and generalizations drawn from them.

Measurement and Analytic Issues

Many of the problems to be considered in this section can be found in varying degrees in some studies, but there is no intention to identify these studies here. The intent of this article is merely to highlight the issues because of their potential influence on this type of study.

The Need for Careful Measurement

In the assessment of any affective variable, be it an attitudinal/motivational characteristic or a personality attribute, attention should be directed toward reliable and valid indices of the construct in

question. By and large, single items tend to be unreliable, and generally do not correlate very highly with other variables. Thus, researchers should avoid using single-item assessments. From reliability theory, it can be shown that reliability tends to increase as a function of the number of items. In most instances, attitudes, motivation, or personality traits are so complex that they cannot be assessed adequately by means of only a few items. To the extent that a variable is worth considering, it is worth devoting sufficient time to its assessment. Often, however, researchers will allot relatively little time to the measurement of affective variables, and when null results are obtained, conclude that the variable itself does not play an important role. The MLAT requires approximately 65 minutes to administer five subscales, and researchers should be prepared to spend as much time assessing affective variables as ability variables, if they are concerned with their relative predictability.

When measuring affective variables, researchers should also concern themselves with the reactions to the items while taking the tests, and to the effect that taking the test might have subsequently. Most affective measures involve judgments of the applicability of the item to the respondents (e.g., is it true of them, do they agree or disagree with the item), and it is easy for individuals to give false answers. In most ability tests, on the other hand, respondents are faced with solving a problem, and the challenge often guarantees that they will do their best. Thus, there is a greater chance with affective measures than with ability tests that subjects might modify their responses because of the measure itself, or because of their perceptions of what a given type of response might mean to them personally.

Because affective measures ask individuals to consider the relevance of various items to themselves, it is also more likely with such measures than with ability tests that the act of taking the test might itself influence subsequent behavior. Having responded to an item assessing an affective characteristic, respondents might begin to think through some of the implications of their answer, and this might result in some change within themselves, thus effecting a change in the attribute measured. Language abilities, on the other hand, are much more stable (cf. Carroll, 1974), and it is unlikely that they would be influenced by the act of taking an ability test.

Power

Based on existing data, some of which are presented in this article, it would seem reasonable to estimate that the correlation between attitudinal/motivational characteristics and proficiency in a second language is around .35, whereas that between language aptitude and proficiency is around .40. Situational factors could, of course, influence the correlations quite dramatically, and an interesting model showing how such relationships could be affected is provided by Carroll (1962). Taking these as values in the population, however, one would still anticipate some sampling variability in any investigation, and the extent of this variability would increase as sample size decreases. Thus, in any given study, if the sample size is low (i.e., around 30 or so), there is a reasonable chance that the correlation obtained may not differ significantly from 0, leading the researcher to conclude that there is no association. Even with large sample sizes, such conclusions would tend to occur once in a while, but the important thing to note is that such results are dependent upon sample size. When conducting such research, therefore, researchers should consider the power of their study based on their best estimate of the value of the population correlation. If the power is low, they might consider ways of improving it. Increasing sample size is one such way, but by no means is it the only one. As indicated previously, reliable assessment of the constructs under investigation is another that should not be overlooked.

Confounding Results by Merging Classes

Generally speaking, language classes are relatively small (i.e., 10 to 30 students) so that, given the preceding comments, it is often desirable to test in more than one classroom, thus increasing the overall sample size. When computing correlations based on such data, however, one should not ignore possible class differences that could influence the magnitude of any correlations obtained. Nonetheless, this is precisely what is done if the data from several classes are simply merged to form a single sample. If correlations are computed on data based on a simple merging of the classes without controlling in some way for differences attributable to classes, the

resulting correlations could be either inflated or deflated over what they would be if class differences were not present.

Judging from the method sections of some articles, it sometimes occurs that data from classes are simply treated as one large sample. It has even happened that data from students in their first year of language study are merged with data from students in their second year. Because second-year students would generally obtain higher scores than first-year students on a common measure of proficiency, regardless of any considerations of aptitude or motivation, merging data in this type of situation is not warranted. Obviously, this would affect the magnitude of any correlations obtained. It seems equally obvious that even if two classes are at comparable levels (e.g., French I), differences in teachers, methods, or emphasis, could produce confounds with both affective measures and indices of proficiency. One teacher, for example, might make students so uncomfortable that their evaluation of the learning context may be less positive overall than students in another class, even though they might obtain comparable or even higher levels of proficiency. This could thus detract from correlations between evaluation of the learning context and proficiency, which might nonetheless be relatively high within each class. Similar factors might operate for other attributes such as motivation, attitudes toward the other community, anxiety and the like.

When more than one class is investigated, therefore, procedures should be employed to rule out possible class effects if the interest is in how individual differences relate to proficiency in a given context. One way of doing this is by computing within-sample (i.e., class) correlations (see, for example, Marascuilo & Levin, 1983), though this is not always easy to do with some computer packages. Another alternative is to standardize the data within class, thus providing scores that have the same mean and standard deviation for each class, and then correlating the merged standard scores. This is equivalent to averaging the correlations within classes, weighting each correlation by the class size. A third alternative would involve first transforming the correlations for each class to Fisher Z-scores before computing a weighted average. Whatever is done, researchers should guard against confounding the relationships under investigation with class differences, unless, of course, this is their

intent. Generally, however, when investigating individual differences, the major concern is with how these variables relate to proficiency, other things being relatively equal. Thus, factors such as class differences should be controlled as much as possible.

Interpreting Regression Coefficients

Most textbooks concerned with multiple regression analysis caution against the straightforward interpretation of either the standardized or unstandardized regression coefficients. The standardized regression coefficients are the weights applied to the standardized variables to provide an aggregate that correlates maximally with the criterion. The magnitude of these weights is a function of the other predictor variables in the equation, and, although their magnitude indicates how much the variables are weighted, it does not indicate how much the variables correlate with the criterion. Some authors (e.g., Thorndike, 1978) suggest that a better interpretative statistic is the structure coefficient, the correlation of the variable in question with the weighted aggregate. Although they are of questionable value if the multiple correlation is not substantial, structure coefficients are conceptually similar to factor loadings in that they are correlations with a dimension. As such, their interpretation is much more straightforward than any interpretation of regression weights. When individuals interpret standardized regression coefficients as if they were factor loadings, the resulting interpretations can be very misleading, and researchers would be advised to consider the original correlations themselves if they are concerned with relationships between variables and criteria.

Confounding Constructs with Achievement

Earlier it was recommended that with personality measures it might be profitable to reconceptualize them to include more directly the language learning context. Thus, instead of investigating the relationship between anxiety and second language achievement, it was suggested that attention be directed toward traits such as (French) class anxiety or (French) use anxiety.

When defining any affective attribute in terms of the second

language, it is important, however, to make sure that the measurement does not confound the construct with proficiency. For example, consider a hypothetical item presumably assessing French class anxiety of the form: "I do very poorly in French because I am very anxious in class."

On the surface, agreement with such an item would seem to reflect French class anxiety, whereas disagreement would apparently reflect an absence of anxiety. However, agreement with the item also indicates that the individual does poorly in French (or feels that he or she does), and disagreement could indicate that the person doesn't do poorly. If scores on this item, or on an aggregate of a series of such items, were to correlate negatively with proficiency, the interpretation could be ambiguous. On the one hand, it might indicate that French class anxiety relates negatively to proficiency, or it might indicate some correspondence between proficiency and self-evaluation. The point is that the interpretative significance of the two could be quite different. Presumably, if one had a series of items like the following sentence: "I do well in French because I get anxious in class," one would anticipate positive correlations with proficiency that could either reflect a correspondence between self-evaluation and assessed proficiency, or support for the notion of facilitative anxiety.

The examples used here are extreme, but, particularly when assessing relevant affective variables, researchers should consider whether or not their assessment of a construct is somewhat confounded with proficiency (cf. Au, 1988). It is not an easy task to decide whether it is or is not, and in his own research the present author has wrestled with the issue on many occasions (cf. Gardner, 1988). Although the example of anxiety was used here, it could be applied equally to other measures such as motivational intensity, language learning strategies, and the like. It is the view of the present author that the items he uses to assess the various attitudinal/motivational components do not include such confounds, but it is easy for such confounds to be introduced unless one is very careful. If this happens, interpretation of any result is compromised.

Conclusions

There would seem to be four major classes of variables that could play a role in second language acquisition, viz., affective variables, cognitive variables, pedagogical variables, and environmental language-relevant variables. The focus in this chapter has been on the first class of variables, affective variables, and it was proposed that they could be subdivided into two groups, personality on the one hand and attitudes and motivation on the other. Based on a review of the literature, it is concluded that the evidence implicating attitudes and motivation in second language learning is fairly substantial, whereas, except in a few instances, the findings suggesting a role for personality variables are less conclusive. One reason suggested is that the research concerned with attitudes and motivation derives largely from a theoretical orientation that links particular attitudes and motivation to the language learning context whereas that for personality is less directed. It is recommended that researchers interested in personality correlates conceptualize and assess them more directly in terms of the language learning context. As an example, it was demonstrated how a trait like French class anxiety could relate to achievement in French, while a trait like general anxiety might not.

Recommendations were also made about the importance of considering a number of issues in research concerned with individual difference correlates of second language proficiency. These issues centered around needs for reliable and unequivocal measurement of the attributes in question, a direct consideration of power as it relates to any particular investigation, care in the interpretation of statistics, (in particular, regression coefficients), and the possible confounding effects of merging data from distinct classes. Especially with research involving adult samples, many of these issues could seriously influence the findings obtained, and thus, the conclusions drawn.

Notes

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6

Predictors of Success in an Intensive Foreign Language Learning Context:

Correlates of Language Learning at the Defense Language Institute Foreign Language Center[1]

John A. Lett, Jr., & Francis E. O'Mara

Introduction

For many years it has been hypothesized that aptitude for learning foreign languages is a construct that is both meaningful and measurable. Indeed, meaningful relationships have long since been established between language training outcomes and scores on various tests that purport to measure language learning aptitude, the best known of which are the *Pimsleur Language Aptitude Battery* (Pimsleur, 1966) and the *Modern Language Aptitude Test* (Carroll & Sapon, 1959). Members of the armed forces who study languages have typically been required to take the *Defense Language Aptitude Test* (DLAT) or, more recently, the *Defense Language Aptitude Battery* (DLAB) (Petersen & Al-Haik, 1976). The purposes to which DLAT/DLAB data have been put include both selection for language training and assignment to particular classes of languages. Of course, as more than two decades of research have shown, cognitive ability, even if defined and measured with reference to specific learning domains, is by no means the only learner characteristic that can be meaningfully linked to learning outcomes.

Accordingly, recent research conducted within the military language training context, like that conducted in other arenas, has addressed a broad array of non-cognitive individual characteristics. The purpose of this paper is twofold: first, to describe the present uses to which DLAB data are routinely put with respect to students

at the Defense Language Institute Foreign Language Center (DLIFLC) in Monterey, California; second, to describe the preliminary outcomes of a major study being conducted jointly by DLIFLC and the U. S. Army Research Institute (ARI).

The Use of DLAB Data at DLIFLC

Each year, significant fiscal and personnel resources are devoted to the acquisition of foreign language proficiency by members of the four uniformed services who are being trained to become military linguists. The vast majority of this language training is provided at DLIFLC in courses ranging in length from 25 to 47 weeks. At DLIFLC, as in other government language schools, languages have been grouped into four categories according to the learning difficulties they present for native speakers of English (see Table 1). For several years, DLIFLC has advised the services to take into account both the language difficulty categories and individuals' DLAB scores in selecting potential language students and assigning them to specific languages. The recommended minimum DLAB scores are 85, 90, 95, and 100 for languages in Categories I through IV, respectively.[1] Each year, DLIFLC reports the extent to which services have complied with those recommendations, and the training outcomes associated with students whose DLAB scores fall above or below the recommended minimum.

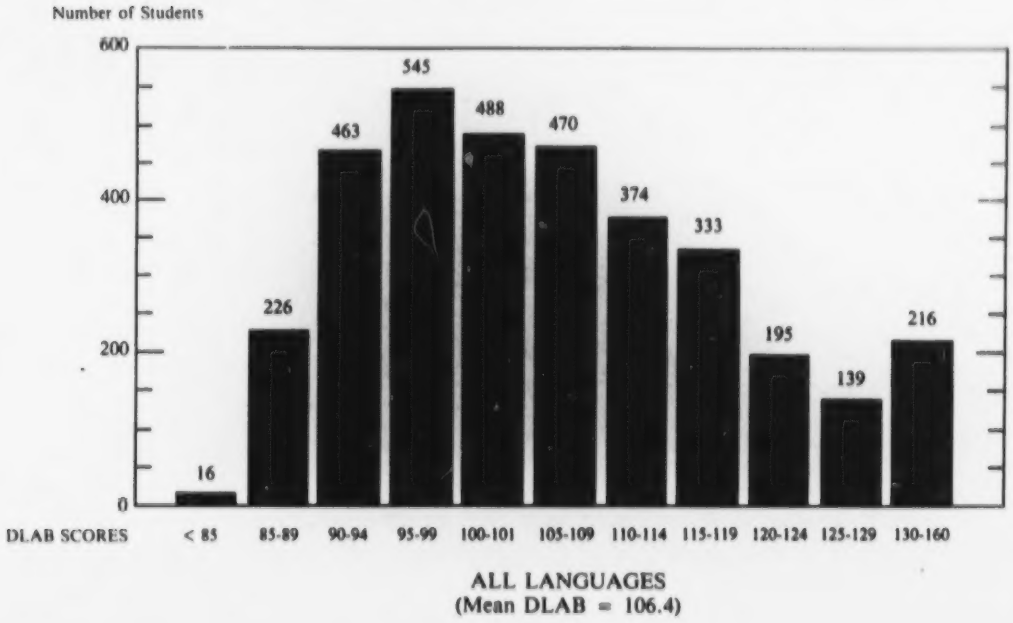
Relationships among DLAB Scores, Language Difficulty Categories, and Language Training Outcomes

The extent to which services have complied with DLAB recommendations has ranged from approximately 79% for 1984 inputs to 87% for 1987 inputs and a return to 84% for 1988 inputs. The bar graph in Figure 2 displays, by language category, the relative proportions and actual numbers for fiscal 1988 inputs. The importance of sending students with appropriate DLABs is typically underscored by pointing out the relationship between DLAB scores and training outcomes in terms of both academic failure and extent of attained proficiencies for those who complete their course. For fiscal 1987 inputs, the academic attrition rates for students falling above and below the recommended DLAB minimums are displayed in Figure 3; the corresponding success rates are displayed in Figure

TABLE 1
Language Difficulty Categories

Category I	Category II	Category III	Category IV
Afrikaans	German	Afghan/Dari	Arabic
Danish	Hindi	Albanian	Chinese
Dutch	Indonesian	Amharic	Japanese
French	Malay	Basque	Korean
Haitian-Creole	Romanian	Bengali	
Italian	Urdu	Bulgarian	
Norwegian		Burmese	
Portuguese		Cambodian	
Spanish		Czech	
Swahili		Finnish	
Swedish		Greek	
		Hebrew	
		Hungarian	
		Lao	
		Nepalese	
		Persian	
		Polish	
		Pushtu	
		Russian	
		Serbo-Croatian	
		Tagalog	
		Thai	
		Turkish	
		Vietnamese	

FIGURE 1
NUMBER OF ACTUAL DLIFLC ENROLLEES IN FISCAL YEAR 1988 BY DLAB CATEGORY



ALL LANGUAGES
(Mean DLAB = 106.4)

4. "Success" is defined as completing the course and scoring at least a level 2 in listening and a level 2 in either reading or speaking, with the remaining score not less than 1, using levels as defined by the Interagency Language Roundtable (ILR).

Of course, there is considerable variation in DLAB scores within these imposed dichotomies, although the relative proportions of high, medium, and low DLAB scores vary according to the language difficulty category, as illustrated in Figures 5 - 8. Because of this rather wide distribution, it is instructive to calculate the success and failure rates for students whose DLAB scores fall into specific ranges. A recent example of these data is displayed in Table 2.

Despite the obvious value of considering DLAB scores in the selection and assignment of military language students, it would be desirable to know much more about the relationships of various individual learner characteristics to language training outcomes. Therefore, a major longitudinal study, which was being planned in 1984, and whose principal objective was the tracking of language skill change over time, was designed to support an investigation of variables associated with initial foreign language acquisition as well. The remainder of this paper presents a brief overview of the study followed by a discussion of preliminary analyses of data regarding initial foreign language skill acquisition. The concluding section indicates subsequent work planned or in progress.

The Language Skill Change Project (LSCP)

Background

Because of the significant fiscal and personnel resources devoted by the Department of Defense to the initial acquisition of foreign language skills each year, there has long been concern both at DLIFLC and among user communities regarding post-DLIFLC erosion of language skill. This concern led to the development of the Language Skill Change Project (LSCP), which is being conducted jointly by DLIFLC and the U. S. Army Research Institute (ARI), with the coordination and support of a Project Advisory Group (PAG) chaired by a representative from the U. S. Army Intelligence Center and School (USAICS) at Fort Huachuca, Arizona. Data collection, data base maintenance, and data analysis and reporting require-

FIGURE 2

DLAB DISTRIBUTION OF FISCAL YEAR 1988 INPUT BY LANGUAGE CATEGORY AND RECOMMENDED MINIMUM DLAB SCORES

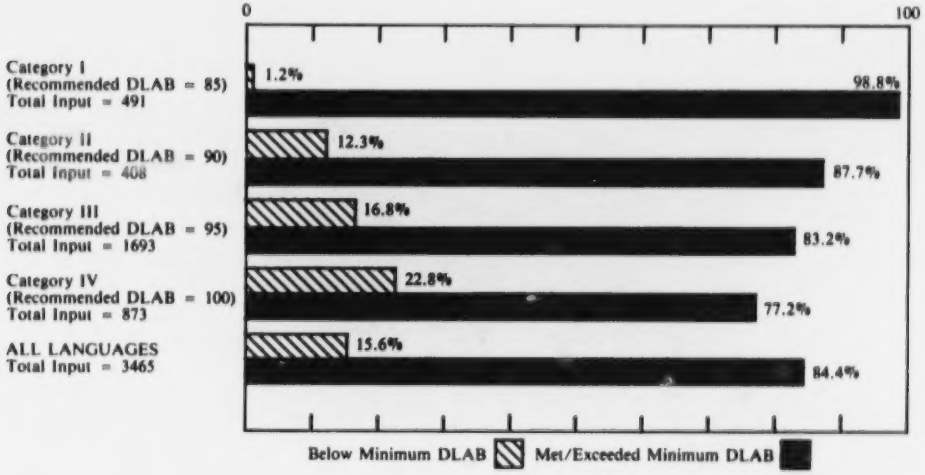


FIGURE 3

PERCENT OF FISCAL YEAR 1987 ENROLLEES ACADEMICALLY ATTRITING BY LANGUAGE CATEGORY AND RECOMMENDED MINIMUM DLAB SCORES

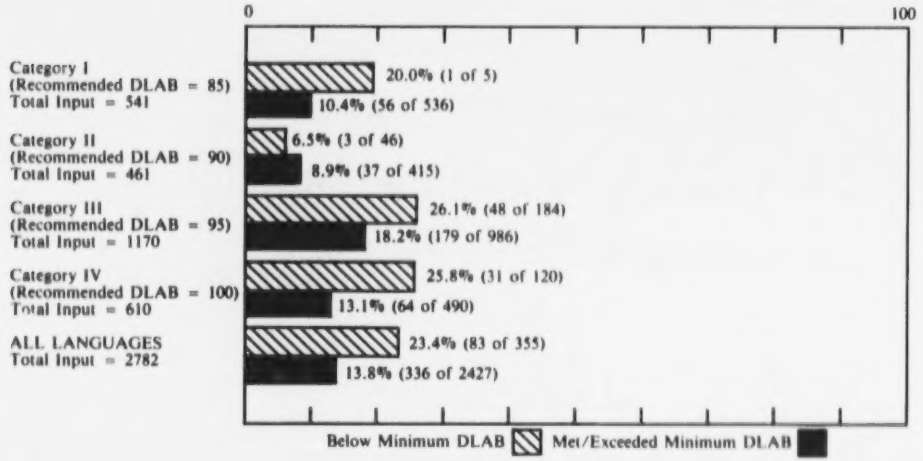


FIGURE 4

PERCENT OF FISCAL YEAR 1987 ENROLLEES MEETING GRADUATION STANDARD BY LANGUAGE CATEGORY AND RECOMMENDED MINIMUM DLAB SCORES

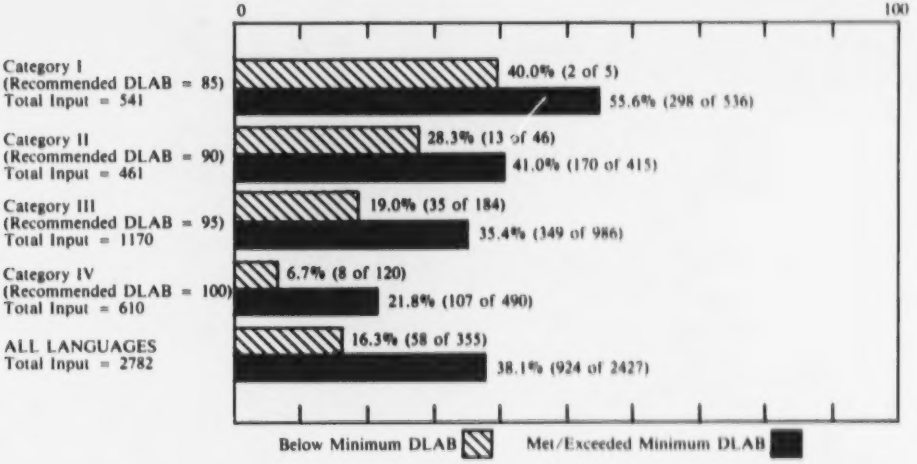
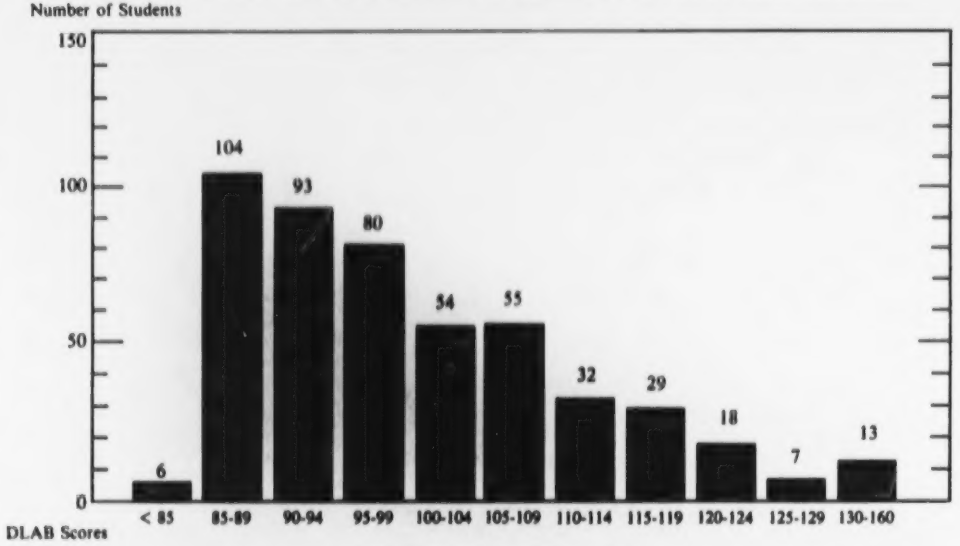


FIGURE 5

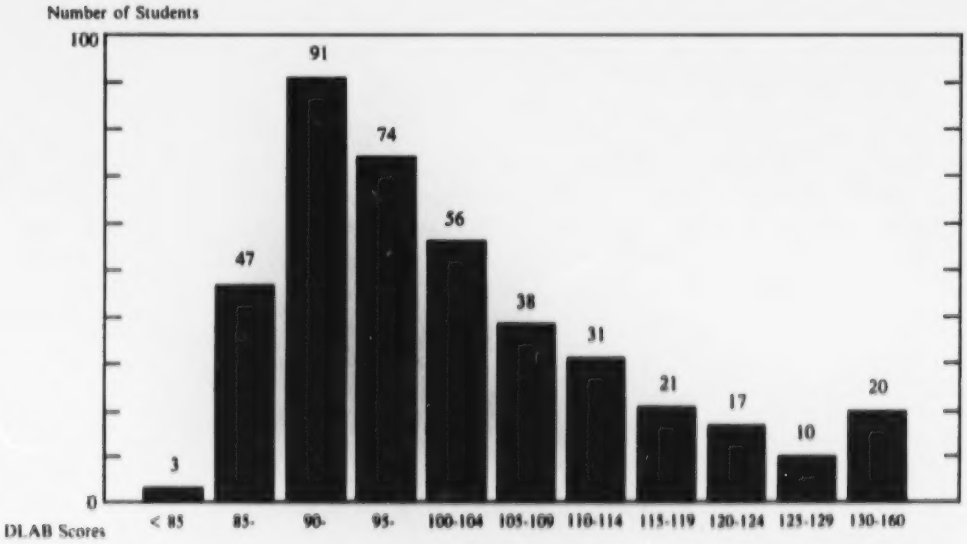
NUMBER OF ACTUAL DLIFLC ENROLLEES IN FISCAL YEAR 1988 BY DLAB CATEGORY



CATEGORY I LANGUAGES
(Mean DLAB = 101.1)

FIGURE 6

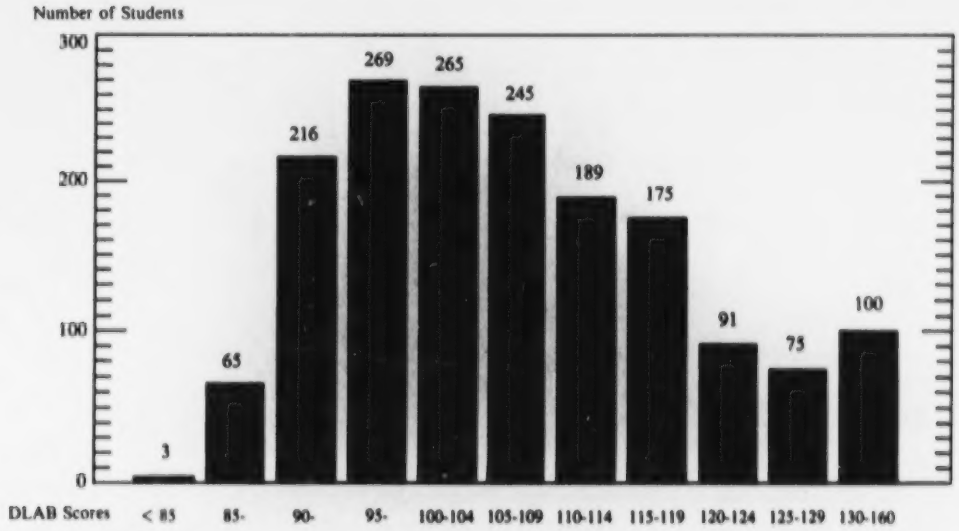
NUMBER OF ACTUAL DLIFLC ENROLLEES IN FISCAL YEAR 1988 BY DLAB CATEGORY



CATEGORY II LANGUAGES
(Mean DLAB = 102.2)

FIGURE 7

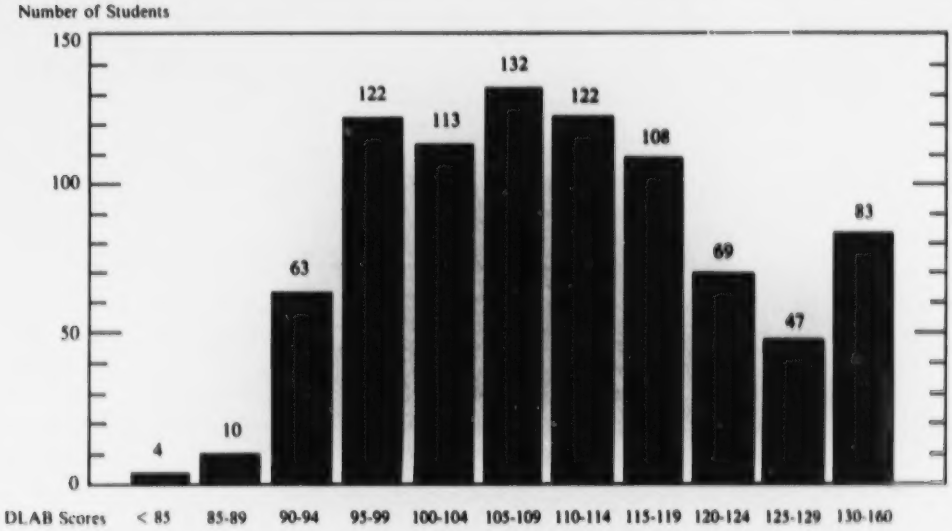
NUMBER OF ACTUAL DLIFLC ENROLLEES IN FISCAL YEAR 1988 BY DLAB CATEGORY



CATEGORY III LANGUAGES
(Mean DLAB = 107.1)

FIGURE 8

NUMBER OF ACTUAL DLIFLC ENROLLEES IN FISCAL YEAR 1988 BY DLAB CATEGORY



CATEGORY IV LANGUAGES
(Mean DLAB = 110.6)

TABLE 2

EXPECTANCY TABLE FOR TRAINING OUTCOMES BY DLAB SCORES*

CATEGORY I LANGUAGES

	<85	85-89	90-94	95-99	100-104	105-109	110-114	≥115
Probability of Academic Attrition	20.0%	15.1%	15.2%	9.3%	10.7%	4.3%	2.2%	7.5%
Probability of Course Completion	40.0%	78.2%	74.3%	86.7%	80.4%	89.4%	88.9%	82.5%
Probability of Meeting Grad Standard	40.0%	44.5%	44.8%	60.0%	60.7%	68.1%	71.1%	63.8%
Denominator for Probabilities**	5	119	105	75	56	47	45	80

* Based on actual disposition of FY87 inputs, basic courses only, minus dependents.

** Numbers of initial FY87 enrollees by language category and DLAB score range.

CATEGORY II LANGUAGES

	<90	90-94	95-99	100-104	105-109	110-114	115-119	≥120
Probability of Academic Attrition	6.5%	13.2%	11.7%	8.5%	10.9%	2.2%	0.0%	5.4%
Probability of Course Completion	82.6%	82.1%	80.9%	85.1%	84.8%	88.9%	100.0%	89.2%
Probability of Meeting Grad Standard	28.3%	27.4%	29.8%	40.4%	45.7%	46.7%	80.6%	62.2%
Denominator for Probabilities**	46	106	94	47	46	45	36	37

* Based on actual disposition of FY87 inputs, basic courses only, minus dependents.

** Numbers of initial FY87 enrollees by language category and DLAB score range.

CATEGORY III LANGUAGES

	< 95	95-99	100-104	105-109	110-114	115-119	120-124	≥125
Probability of Academic Attrition	26.7%	27.4%	24.9%	20.3%	12.9%	10.2%	13.9%	5.4%
Probability of Course Completion	63.9%	67.5%	65.9%	71.5%	78.2%	79.6%	82.3%	83.8%
Probability of Meeting Grad Standard	18.3%	24.9%	29.7%	29.7%	33.9%	38.8%	40.5%	62.3%
Denominator for Probabilities**	180	197	185	172	124	98	79	130

* Based on actual disposition of FY87 inputs, basic courses only, minus dependents.

** Numbers of initial FY87 enrollees by language category and DLAB score range.

CATEGORY IV LANGUAGES

	<100	100-104	105-109	110-114	115-119	120-124	125-129	≥130
Probability of Academic Attrition	26.1%	27.5%	16.1%	10.1%	8.5%	12.7%	5.4%	5.1%
Probability of Course Completion	60.5%	63.8%	71.3%	75.9%	73.2%	84.1%	86.5%	83.1%
Probability of Meeting Grad Standard	6.7%	8.8%	14.9%	20.3%	18.3%	23.8%	35.1%	47.5%
Denominator for Probabilities**	119	80	87	79	82	63	37	59

* Based on actual disposition of FY87 inputs, basic courses only, minus dependents.

** Numbers of initial FY87 enrollees by language category and DLAB score range.

ments are supported by Advanced Technology, Inc., under an Office of Personnel Management contract funded mainly by ARI and DLIFLC. In the remainder of this section, the following topics are discussed: (a) the overall LSCP research design; (b) the predictor and criterion variables; and (c) the analytical approach.

The LSCP Research Design[3]

Design and sample. The LSCP is a longitudinal study in which each subject is tracked from entry into DLIFLC through completion of the basic course, through advanced individual training (AIT) in technical job skills at a follow-on school, then through post-AIT assignments for the next two years or until the end of the first enlistment period. LSCP subjects are defined as all U. S. Army-enlisted students entering DLIFLC from February 1986, through August 1987, who held or were being trained for the military intelligence (MI) military occupational specialties (MOS) of 97B, 97E, 98CL, and 98G,[4] and who were assigned to study Korean, Russian, German, or Spanish.[5] This sample consists of 1,903 individuals, distributed as shown in Table 3.

Measurement plan. Data were gathered from LSCP students on at least six occasions: three times at DLIFLC, once at the end of AIT, and at each annual foreign language proficiency test thereafter. Data collection events and their purposes are as follows:

Time 1: Prior to beginning DLIFLC training, subjects completed an extensive array of questionnaires and inventories designed to measure variables thought to be relevant to the prediction of language learning outcomes.

Time 2: Approximately 12 weeks into their language training, subjects completed an additional set of questionnaires. These questionnaires were similar to the first set, but they required knowledge resulting from a minimal amount of language instruction.

Time 3: At the end of their DLIFLC language training, subjects completed a composite set of measures selected from among those previously administered at Times 1 and 2. At approximately the same time, LSCP subjects, along with their non-LSCP cohorts, were administered the appropriate Defense Language Proficiency Test (DLPT).[6]

Time 4: At the end of AIT, LSCP students were administered

TABLE 3

COMPOSITION OF LSCP SAMPLE
BY LANGUAGE AND MOS

	97B	97E	98C	98G	TOTAL
KOREAN	13	27	79	276	395
RUSSIAN	23	81	133	554	791
GERMAN	26	45	58	285	414
SPANISH	8	28	61	206	303
TOTAL	70	181	331	1321	1903

another form of the DLPT III, along with a questionnaire regarding the extent and nature of their language use and language maintenance activities since their departure from DLIFLC.[7]

Times 5-6/7: At each of the annual language proficiency assessments mandated by Army regulations, LSCP subjects and their immediate supervisors will be given a language use questionnaire similar to, but more extensive than, the AIT questionnaire.[8]

Criterion and Predictor Variables

Criterion measures. As mentioned above, the DLPT III constitutes the measure of language proficiency for this study.[9] The DLPT III measures language proficiency in three skill modalities: listening, reading, and speaking. Listening and reading are assessed via a computer-scorable multiple-choice test validated and normed in accordance with the official ILR language proficiency level descriptions; speaking proficiency is assessed at DLIFLC in a face-to-face ILR oral interview, with successive (i.e., post-DLIFLC) speaking tests administered via tape recordings and test booklets. Examinees' recorded responses are returned to DLIFLC for rating by certified testers. All DLPT III materials are controlled test items and are not available outside the government.

Predictor variables. Guided by the existing literature on second and foreign language learning, several types of variables were identified as potential predictors of success in second language learning. These variables include both data routinely available in soldiers' official records and data gathered specifically for this study. They are described here in an approximate order of accessibility and increasing data collection cost or intrusiveness.

General ability - Ability subsumes general ability, memory, verbal ability, and the more specific aptitude to acquire skills and knowledge in a particular area. General intellectual ability is as likely to have an effect upon the acquisition of a second language as it will on any form of learning or cognitive task, and especially because of the heavy verbal component typically included in the measurement of such ability. The General Technical (GT) composite of the Armed Services Vocational Aptitude Battery (ASVAB) was selected by virtue of its availability and general nature, the GT being a composite of verbal subtests (word knowledge and paragraph

comprehension) and arithmetic reasoning.

Language learning aptitude - The Defense Language Aptitude Battery (DLAB), required by all services as part of the selection process for future language students, was used in this study. Its assumptions and tasks are very similar to those of the MLAT, and its predictive power has been demonstrated to be equal to or slightly greater than that of the MLAT with DLIFLC students (Petersen & Al-Haik, 1976).

Available demographics - Normal DLIFLC registration procedures generate a student record containing information thought to be relevant to language learning success. Variables used include sex, level of education, and age.[10] Sex has been shown to be an important variable in first language development (Gage & Berliner, 1975). It may be hypothesized that differences in sex, age, and education will extend to second language learning as well. Successful educational experience is a joint indicant of an individual's ability and motivation to successfully perform in an academic environment. There are conflicting results from studies on the effect of age upon language acquisition. Because the range in ages considered in the present study is very small compared to that typically considered in the literature observed, age differences may reflect maturity and ability to perform in the structured military environment characterizing the learning situation.

Handedness - Because brain hemisphericity is thought by some researchers to be related to language learning, handedness was included in the special LSCP Language Background Questionnaire (LBQ) created for this study. Neurological studies have shown that the language function is largely concentrated in the left hemisphere. It is a reasonable premise then that people who are left-brain dominant (i.e., right-handed) might have superior verbal skills than right-brain dominant individuals. Research has demonstrated this skill difference, suggesting that a parallel difference may be expected in second language learning. Although handedness is by no means a sophisticated or reliable indicant of hemispheric dominance, it does have some history of usage, and was used in this study as an economical means of gathering data to support a preliminary assessment of the potential value of this predictor in the DLIFLC environment.

Prior FL experience and proficiency - The LBQ was also used to collect information regarding prior foreign language training experience and self-reported prior foreign language proficiency. It can be expected that past experience in learning a foreign language will be a strong indicator of success in future learning of that language. This can be due to the head start provided in the earlier training in knowledge of the language's vocabulary and syntax, and to the positive attitudes toward the language acquired through this training. Previous experience in learning foreign languages, other than those subsequently studied, should also be a predictor of subsequent language acquisition success, both as an indicant of the desire and ability to learn languages and because of the acquisition of a broader understanding of different syntactical structures.

Attitude/motivation at start and at 12 weeks - The work of Robert Gardner over the last three decades (see also Gardner's chapter in this volume) provided the nucleus for the measures of attitude and motivation used in the LSCP. With Gardner's assistance, many scale items were modified slightly for use in DLIFLC's intensive military training context. In addition, new Gardner-inspired scales measuring various aspects of instrumental motivation were created by DLIFLC and ARI researchers (Lett & Ekstrom, 1984) for use in this study. In addition to the Gardner battery, Hiller's Personal Outlook Inventory (Kirby & Hiller, 1973) was used at the start as a measure of general intellectual self-confidence.

Learning strategies - A recent and growing interest in the language learning literature has been the role of learning strategies in acquiring and developing foreign language skills (Wenden & Rubin, 1987; Oxford, 1989). A growing body of evidence has suggested that good language learners use more strategies, better strategies, and strategies more appropriate to particular language skills (Papalia & Zampogna, 1977; Tyacke & Mendelsohn, 1986). While learning strategies are quite likely to be especially potent in naturalistic language acquisition, it is also likely that the self-initiated use of appropriate learning strategies will contribute to foreign language learning in an intensive learning environment such as DLIFLC's. Therefore, under an ARI-OPM contract, a Strategy Inventory for Language Learning (SILL) was created by Rebecca Oxford for use in this study (Oxford, 1986). The SILL was used at the 12-week point

and at the end of DLIFLC training; shortened forms were used at AIT and are being used in post-AIT administrations.

Personality and cognitive style - Various personality and cognitive style variables have been advanced as predictors of foreign language acquisition. These include empathy (Naiman, Fröhlich, & Todesco, 1975), extraversion (Naiman, et al., 1975), field independence (Bialystok & Frohlich, 1978), analytic thinking (Shipman & Shipman, 1985), tolerance for ambiguous situations (Witkin & Goodenough, 1977), and intellectuality (Kirby & Hiller, 1973). Measures of empathy (Gough, 1957), ambiguity tolerance (Norton, 1975), field independence (Oltman, et al., 1971), and extraversion (Eysenck & Eysenck, 1963) were included in the Time 1 battery.

Other ability - Three additional measures of ability were included in the Time 1 battery, i.e., the Watson-Glaser Critical Thinking Appraisal *(Watson-Glaser Critical Thinking Appraisal*, 1977, 1980), Flanagan's Industrial Test of Memory (Flanagan, 1963), and Flanagan's Industrial Test of Expression (1960). Although these measures have no known history of prior use in the prediction of foreign language learning, and were originally included to support an ancillary study, they have turned out to be rather interesting components of the regression equations examined to date. Thus, they are reported as part of this data set.

The Analytical Approach

Although the data collected in this study will lend themselves to the investigation of various explanatory models of classroom-based language learning by means of a wide array of statistical approaches,[11] for the present purpose we examined them from a predictive perspective in order to explore their potential for enhanced selection and assignment procedures for military linguists. Analysis procedures included data reduction via factor analysis and principal components analysis, followed by multiple regression analyses using a forward progression, forced-order-of-entry approach. The nature and results of these preliminary analyses are presented below.

Analyses and Findings

Method

Data reduction. The ratio of the numbers of variables and subjects is always a concern in multivariate research, and the use of a large group of predictor variables requires careful consideration of the disadvantages and the advantages of so doing, and of the procedural implications of the size of the data set. Therefore, prior to conducting analyses on the prediction of DLIFLC attrition and attained foreign language proficiency levels, efforts were undertaken to determine how the relatively large group of predictors could be usefully consolidated. The objectives of these efforts were the following:

(a) to reduce the extent of the problems encountered in multiple regression analyses (MRA's) when predictor variables are highly intercorrelated (multicolinearity);
(b) to reduce the number of variables employed in the multiple regression analyses;
(c) to increase the reliability of the predictor measures used in the MRAs; and
(d) to provide a more parsimonious interpretation of the data and the subsequent development of explanatory models.

Analyses included a variety of factor analyses of the SILL, building upon but going beyond those reported by the author (Oxford, 1986), followed by a principal components analysis of the entire set of predictor measures, using scale scores and factor scores where available and raw data where appropriate (e.g., years of prior foreign language study).

After considering both the psychometric results and the theoretical and practical aspects of the overall goal of this study, three composite measures were defined and their reliabilities (coefficients alpha) and intra-set variable intercorrelations were examined. These composites were total years of education in a foreign language other than the DLIFLC language (alpha = .70), attitudes and motivation at the start of DLIFLC training (alpha = .73), and attitudes and motivation during DLIFLC training (alpha = .87). The use of these "meta-

variables" permitted a net reduction of ten predictor variables; the resultant array of measures as utilized in the regressions discussed in this paper is indicated in Table 4. The detailed description of these data reduction efforts is reported elsewhere (O'Mara, 1989). It should be noted in passing that this analytic approach obtains greater reliability in multiple predictions at the expense of the ability to assess the value of individual predictors, (e.g., a specific measure of cognitive style or certain attitude subscales). Subsequent analyses will address these issues from a variety of perspectives; results will be reported as they become available.

Sample size. The initial sample of students (1,903) was considerably reduced by several factors. First, a substantial number of students routinely fail to complete DLIFLC language training for various reasons, both academic and non-academic. Attritees for any reason are clearly not includable in equations using end-of-course proficiency scores as criterion measures, and only academic attritees were included in analyses attempting to predict attrition. Second, it was decided that for the initial round of analyses, the sample would be limited to those students who completed their training on schedule (i.e., those who were not held back or transferred to another class). Third, the listwise deletion approach to the handling of missing data further reduced the sample, although by a gratifyingly small amount. The resultant number of cases submitted to regression analysis was 881 for equations with proficiency scores as the criteria and 1,376 for those predicting attrition, using only Time 1 predictors in the attrition analyses, i.e., data collected at the start of DLIFLC training.[12]

Analyses. Multiple regression analyses were conducted on the collected data to determine the degree to which the predictor measures collected at Times 1 and 2 predicted success in foreign language learning at DLIFLC. Two lines of analysis were pursued: the first examining the prediction of DLIFLC attrition, and the second looking separately at the prediction of acquired speaking, listening, and reading skills at the end of the language training.

Because the order in which predictor measures are entered into a regression analysis can influence the analysis results, some thought was given first to the basis of this order. To optimize the costs and benefits of implementing the research results, the tested prediction

TABLE 4
VARIABLE CLUSTERS USED IN MULTIPLE REGRESSIONS

1: GENERAL ABILITY
- ASVAB GT

2: LANGUAGE APTITUDE
- DLAB

3: DEMOGRAPHICS
- Sex
- Education
- Paygrade

4: HANDEDNESS

5: PRIOR FL TRAINING
- Grade School, DLI FL
- High School, DLI FL
- College, DLI FL
- Combined Other FL

6: PRIOR FL PROFICIENCY
- DLI Language
- Other FL

7: ATT/MOTIVATION at START
- Personal Outlook Inventory
+ Interest in FLs
+ Integrativeness
+ Instrumental: Education
+ Instrumental: Occupational
+ Instrumental: Machiavellianism

8: ATT/MOTIVATION at 12 WEEKS
- Course Difficulty
+ Class Anxiety
+ Use Anxiety
+ Motivational Intensity
+ Att Towards Learning
+ Att Towards Course
+ Att Towards Instructor

9: LEARNING STRATEGIES
- Uses L2 in Practice
- Good Study Habits
- Gives Meaning to Language
- Uses Mental Images
- Intensity of Study
- Planning

10: PERSONALITY/COG. STYLE
- Empathy
- Ambiguity Tolerance
- Field Independence
- Extraversion

11: OTHER ABILITIES
- W-G Critical Thinking Inventory
- Flanagan Test, Memory
- Flanagan Test, Expression

NOTE: "+" designates measures combined into a single measure within block.

model was structured in an order of increasing implementation costs. That is, the measures already being used to select and place DLIFLC students (the ASVAB and the DLAB) were included first in the prediction equation. These were followed by measures for which data were already available, though not presently used for student selection (demographic measures). Next were included measures for which data could be readily obtained at low cost to support selection decisions (handedness, prior foreign language training, prior foreign language proficiency). Finally, measures which, if they were included in DLIFLC student selection, would require administering and scoring additional instruments, were entered into the regression analyses. In doing this, the motivational measures (Time 1 motivation and Time 2 motivation during training) were entered first, followed by the learning strategies measures, the scores on the various personality measures, and then the scores achieved on the ability measures other than the ASVAB and DLAB. The measures falling into each of these blocks are indicated in Table 4.

Findings

Overall predictive power. Table 5 presents a summary of the overall predictive power of the twenty regression equations performed in this study. The squared multiple correlations ranged from .17 to .45, and all but one were highly significant. These data support the following observations: First, attrition was slightly less predictable than obtained proficiencies—the percentage of variance in attrition data ranged from 16.5 to 29.6 (mean = 21.3), versus a range of 16.6 to 45.0 (mean = 29.8) for obtained proficiencies. Second, the equations for each language were more powerful than those based on data aggregated across languages (mean variance accounted for = 29.8% versus 19.4%). Third, predictability varied across languages and by criterion: For attrition, Russian was the most predictable, followed by Spanish and Korean, and then by German; for attained proficiencies, Spanish and German were generally more predictable than Russian and Korean. Finally, speaking was less predictable than listening and reading for all languages.

Contributions of various predictor blocks. In order to assess the relative contributions of each predictor block to each prediction equation, we examined the increment of predictive variance (R^2

change) provided by each block, given its order in the equation. These data are displayed in Table 6.

Graphing the statistically significant data by block across criteria and by criterion across blocks made it possible for us to observe certain patterns with respect to the predictive usefulness of each block. In predicting attrition, for example, language aptitude was more important than general ability, especially for Russian and Korean, and other cognitive abilities also contributed significant variance in three of the four languages, despite the last-place position of that block. Available demographics were also important in three languages, whereas attitudes and motivation were meaningful predictors in only two languages (Russian and German), and prior language training or proficiency made significant contributions to predictive power for only one language each (Spanish and Russian, respectively). Note, however, that prior training (i.e., the lack of same) was the strongest single predictor of attrition in Spanish.

In the prediction of attained proficiencies, language aptitude continued to be important for Korean and Russian, but general ability also played a role in Russian, German, and Spanish, especially the last. Other cognitive abilities continued to play surprisingly strong roles, making significant contributions in six equations distributed over three languages. Prior language training or proficiency contributed relatively little except in German and Spanish, but was a relatively strong predictor of speaking proficiency in both of those languages. Attitudes and motivation at the beginning of training were notably weak predictors, contributing to only two of the twelve by-language equations (German and Spanish listening), whereas when measured at the twelve-week point, these constructs contributed significantly to eight equations, and included the highest R^2 change in the entire data set (Spanish speaking). Finally, learning strategies made significant contributions to all four languages (in seven equations), but personality and cognitive style variables contributed in only two equations (Korean and German reading).

TABLE 5
SUMMARY OF MULTIPLE CORRELATION STATISTICS BY LANGUAGE AND CRITERION

Language	N	Criterion	R	R^2	ADJ. R^2	SIG(F)
Korean	325	Attrition	.4686	.2196	.1543	.0000
	200	Listening	.5203	.2707	.1413	.0018
	200	Reading	.5704	.3253	.2056	.0000
	200	Speaking	.4297	.1846	.0398	.1699
Russian	534	Attrition	.5437	.2957	.2595	.0000
	329	Listening	.5249	.2756	.1999	.0000
	329	Reading	.5650	.3192	.2481	.0000
	329	Speaking	.4070	.1657	.0786	.0035
German	279	Attrition	.4113	.1692	.0835	.0043
	188	Listening	.6152	.3785	.2549	.0000
	188	Reading	.6654	.4427	.3320	.0000
	188	Speaking	.5685	.3232	.1887	.0002
Spanish	238	Attrition	.4660	.2172	.1207	.0009
	164	Listening	.6706	.4497	.3204	.0000
	164	Reading	.6280	.3944	.2522	.0000
	164	Speaking	.5774	.3334	.1768	.0017
Total	1376	Attrition	.4063	.1651	.1490	.0000
	881	Listening	.4434	.1966	.1672	.0000
	881	Reading	.4952	.2453	.2177	.0000
	881	Speaking	.4092	.1675	.1371	.0000

TABLE 6
R^2 CHANGES AND OVERALL R^2S BY PREDICTOR BLOCK FOR ATTRITION AND ATTAINED PROFICIENCIES[1]

ATTRITION

LANG	GABL	LAPT	ADEM	HAND	PRTR	PRPR	AMST	AMMD
KOREAN	0062	**0825***	**0410***	0084	0028	0092	0223	----
RUSSIAN	**0371***	**1634***	**0298***	0039	0034	**0103***	**0261***	----
GERMAN	0095	0068	**0370***	0067	0280	0048	**0607***	----
SPANISH	0007	**0176***	0252	0170	**0677***	0046	0241	----
ALL	**0108***	**0571***	**0259***	**0049***	**0292***	**0051***	**0090***	----

LANG	LNST	PERS	OABL	RSQR	SIGR^2	NUMR	ADJR^2
KOREAN	----	0121	**0351***	**2196***	0000	325	1543
RUSSIAN	----	0034	**0182***	**2957***	0000	534	2595
GERMAN	----	0036	0122	**1692***	0043	279	0835
SPANISH	----	0232	**0370***	**2172***	0009	238	1207
ALL	----	0028	**0204***	**1651***	0000	1376	1490

[1]Abbreviations for predictor blocks refer to block labels as set forth in Table 4. The last three columns present the significance of the R^2, the number of cases, and the adjusted R^2. Asterisks and boldface identify R^2 changes significant at $p < .05$.

ATTAINED PROFICIENCIES

LANG								
KOREAN	SKILL	GABL	LAPT	ADEM	HAND	PRTR	PRPR	AMST
	LIST	0027	0247*	0176	0030	0168	0313*	0055
	RDNG	0003	0717*	0161	0206	0122	0235	0101
	SPKG	0172	0102	0113	0023	0184	0247	0017
	AMMD	LNST	PERS	OABL	RSQR	SIGR^2	NUMR	ADJR^2
	0531*	0383	0399	0380*	2707*	0018	200	1413
	0331	0625*	0696*	0057	3253*	0000	200	2056
	0429*	0324	0131	0105	1846	1699	200	0998
RUSSIAN	SKILL	GABL	LAPT	ADEM	HAND	PRTR	PRPR	AMST
	LIST	0554*	0561*	0078	0003	0104	0069	0161
	RDNG	0434*	0781*	0030	0198*	0168	0043	0097
	SPKG	0001	0134*	0127	0034	0177	0103	0006
	AMMD	LNST	PERS	OABL	RSQR	SIGR^2	NUMR	ADJR^2
	0209	0597*	0075	0346*	2756*	0000	329	1999
	0712*	0305*	0205	0219*	3192*	0000	329	2481
	0408*	0256	0130	0281*	1657*	0035	329	0786
GERMAN	SKILL	GABL	LAPT	ADEM	HAND	PRTR	PRPR	AMST
	LIST	0774*	0087	0036	0158	0499*	0092	0370*
	RDNG	1417*	0167	0044	0169	0276	0146	0122
	SPKG	0145	0022	0369	0206	0952*	0184	0124

GERMAN	AMMD	LNST	PERS	OABL	RSQR	SIGR^2	NUMR	ADJR^2
	0608*	0606*	0343	0211	3785*	0000	188	2549
	0501*	0741*	0404*	0440*	4427*	0000	188	3320
	0323	0415	0137	0355*	3232*	0002	188	1887
SPANISH	SKILL	GABL	LAPT	ADEM	HAND	PRTR	PRPR	AMST
	LIST	1185*	0045	0466*	0219	0500*	0559*	0502*
	RDNG	1160*	0228*	0092	0016	0203	0115	0291
	SPKG	0006	0001	0050	0060	0308	0805*	0187
	AMMD	LNST	PERS	OABL	RSQR	SIGR^2	NUMR	ADJR^2
	0082	0665*	0084	0189	4497*	0000	164	3204
	0518*	0920*	0105	0296	3944*	0000	164	2522
	1279*	0301	0119	0217	3334*	0000	164	1768
ALL	SKILL	GABL	LAPT	ADEM	HAND	PRTR	PRPR	AMST
	LIST	0197*	0017	0050	0009	0253*	0164*	0141*
	RDNG	0333*	0116*	0057	0095*	0233*	0093*	0055
	SPKG	0041	0069*	0042	0003	0580*	0161*	0016
	AMMD	LNST	PERS	OABL	RSQR	SIGR^2	NUMR	ADJR^2
	0397*	0495*	0037	0206*	1966*	0000	881	1672
	0583*	0399*	0253*	0236*	2453*	0000	881	2177
	0423*	0286*	0027	0027	1675*	0000	881	1371

Discussion

Limitations

Restricted sample. A number of considerations limit the extent to which these findings can be generalized with respect to other studies purporting to predict or explain language learning outcomes. First, most DLIFLC students, including all the participants in this study, have already been twice selected from a larger pool on the basis of their ASVAB and DLAB scores. Thus, scores for general ability and language learning aptitude are not distributed in our sample as they are among the entire pool of military applicants or recruits, which in turn presumably affects the relative predictive power of those variables. The most similar population outside DLIFLC would probably be first-year students at a two-year college who have higher-than-average language learning aptitude. However, we have not made formal comparisons between the profiles of these groups to ascertain the degree of comparability.

The DLIFLC context. A second consideration is the nature and length of language training at DLIFLC. Students are in formal classes six hours a day for 25 to 47 weeks, or the seat-time equivalent of 12.5 to 23.5 60-hour semesters. Furthermore, these students are all members of the Armed Forces (the Army, in the case of this sample), and the consequences of academic failure are rather more significant than they are for the students who comprise the samples for most studies in other academic settings. Thus, the roles played by affective variables may be rather different among DLIFLC students than among those typically studied by, say, Gardner and his associates (see Gardner & Lambert, 1959; Gardner, Lalonde, & Pierson, 1983).

Language-method confounding. A definite advantage of conducting research at DLIFLC is the wide variety of languages being taught and learned. Thus, it is both possible and reasonable to hypothesize linguistic bases for some of the differences noted in the relative importance of certain predictor blocks across languages. However, despite the homogeneity of the language learning context shared by all DLIFLC students when compared to that of high school or college students, it is reasonable to wonder whether that context is pedagogically equivalent across all DLIFLC languages, or whether in fact the curricular-instructional realities differ in non-random

ways across language groups by virtue of the varied cultural backgrounds, historical traditions, and pedagogical assumptions among DLIFLC instructors. Considerably more research will be needed to tease out language effects from method effects.

Language-aptitude confounding. Although both general ability and language learning aptitude are distributed over a fairly wide range among students within each language group at DLIFLC, it is also a fact that the distribution is not random, due to the minimum language aptitude scores recommended for assignment to given languages. Thus, the range of aptitude scores reaches progressively higher levels as one examines the aptitude distributions in Spanish, German, Russian, and Korean.

Analytic considerations. It should be remembered that we chose to conduct these preliminary analyses from the perspective of a reality-constrained prediction model. We have not yet indulged ourselves in either an unconstrained stepwise approach or any of various approaches to theory-testing and explanatory model-building. Thus, no direct comparisons with results from studies that have used those kinds of analyses would be appropriate, even if the limitations discussed above did not exist. Furthermore, the analyses reported in this report have not attempted to go beyond the predictor block level. That is, even within the constrained predictor model, a considerable amount of follow-up analysis remains to be done before there is a discussion of the relative importance of specific variables within blocks. This fact, along with the others pointed out in this section, would make it unwise and inaccurate to conclude that this research conclusively shows, for example, that the Gardner model is untenable at DLIFLC, or that personality variables have no role to play in predicting success or failure at DLIFLC.

Conclusions

Despite the considerations discussed above, the results presented in this report support, at least, some conclusions:

Success in language learning at DLIFLC can be predicted. Despite the rigorous standards by which DLIFLC students are selected, there remain systematic differences between those who succeed at DLIFLC and those who do not. With only a single exception, the 20

prediction equations tested in this effort significantly predicted DLIFLC attrition and foreign language proficiency achievement. On the average, the significant prediction equations accounted for 27.7% of the variance in the criterion measures.

Predictability varies across criteria of student success. In general, student attrition is less well predicted by the variables considered than are the measures of student foreign language skill (21.3% versus 29.8%). In part, this may occur because attrition, unlike the proficiency measures, is a dichotomous variable, and hence, is by its nature more difficult to relate statistically to the predictor variables. It may also be the case that the more powerful correlates of DLIFLC attrition lie outside the set of predictors used in this research.

The three foreign language skills tested at the end of training also differed in their predictability: Prediction of attained speaking skill falls notably short of that for either reading or listening comprehension. Because subsequent analysis confirmed that this difference could not be attributed to differences in the way in which the three skills are scored in the DLPT, other possible explanations come to mind: (a) the inherent difficulty in reliably measuring speaking proficiency; (b) the greater complexity involved in learning to generate language versus interpreting that spoken or written by others; (c) the fact that speaking scores tend to occupy a narrower range than do listening and reading scores; or (d) other factors.

Cognitive ability consistently predicts success in foreign language learning. Where achieved foreign language proficiency was most strongly predicted (reading and listening), the three types of ability measures (ASVAB, DLAB, other abilities) figured prominently in this prediction. Among these predictors, the DLAB appeared to be more valuable in predicting success in the more difficult languages, while the ASVAB GT was more fruitful when applied to those that are less difficult. This fact may suggest that the DLAB is better able to discriminate differences in the very high ability ranges found among students of Russian and Korean, although it also may reflect covert confounding variables such as those discussed in the preceding section.

Non-cognitive measures offer significant potential in predicting and enhancing success in acquiring foreign language skills. Although results were somewhat different from those obtained in

prior studies, student attitudes, motivation, and applied learning strategies did make significant contributions to the prediction of listening and reading skills, with motivation providing relatively important increments of prediction to the less predictable speaking skills. This result points to the potential value of improving students' DLIFLC performance through methods beyond more stringent selection. Indeed, follow-on analyses in this project will include a focus on identifying ways to utilize knowledge of individual student characteristics and their relationships to learning outcomes at DLIFLC in efforts to maximize student success, regardless of cognitive capabilities and language difficulty.

Notes

1) This study was supported by OPM Contract Number 87-9035, jointly funded by the Army Research Institute and the Defense Language Institute Foreign Language Center. The opinions expressed are those of the authors and should not be construed as official agency positions.
2) It should be noted that these scores are all below the mean score for the typical annual contingent of entering students, which tends to average around 105-106; see Figure 1 for the frequency distribution of all students entering DLIFLC in fiscal 1988.
3) More detailed descriptions of the information presented in this section and the next can be found in Kahn and Lett, 1985; Mutter, 1985; and Bush, 1987.
4) MOS 97B (counterintelligence agent) and 97E (interrogator) duties require the use of all four language skills; 98CL (analyst) and 98G (voice interceptor) duties involve primarily the use of listening and reading skills.
5) A limited number of "bypasses" is also included at the request of one MI user community, these being Army MI personnel who did not acquire their foreign language skills at DLIFLC.
6) All four LSCP languages are tested by the DLPT III, not the earlier DLPT I or DLPT II.
7) AIT data collection was completed in December, 1988.
8) Although the original time period between successive post-AIT

DLPT testing was set at six months, it was later lengthened to nine months for logistical reasons. Finally, with the Army's foreign language proficiency pay program driving greater compliance with annual language testing requirements, it was decided to utilize the latter for all post-AIT DLPT measures.

9) An additional, dichotomous, measure of language training success (i.e., completing the entire DLIFLC basic course) was constructed to facilitate studies regarding the prediction of academic attrition. Students who failed to complete the course for non-academic reasons were excluded from the study sample.
10) For the analyses reported in this paper, age is represented by the surrogate variable of military pay grade.
11) Subsequent analyses of the present data set will address explanatory models; analyses of AIT and field-based data will address the question of skill change over time and variables related thereto—including initial proficiency levels attained at DLIFLC.
12) Because of listwise deletion, the use of Time 2 data as well as Time 1 data would effectively eliminate from the sample all those who attrited before Time 2 data collection. Thus, the research question implicitly addressed by such analyses would be how well one can predict attrition among those who are still enrolled after about 12 weeks of instruction, not how well potential attrition can be predicted among all who begin the course.

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LANGUAGE APTITUDE RECONSIDERED

This volume is a collection of papers presented at an invitational conference on the prediction of adult foreign language learning funded by the U.S. Government's Interagency Language Roundtable and hosted by the ERIC Clearinghouse on Languages and Linguistics and the Center for Applied Linguistics. The topics discussed include the Modern Language Aptitude Test and other predictive measures, the role of affective factors, cognitive styles, learning strategies, personality, and brain hemisphericity. Several articles report on the latest research by U.S. Government agencies.

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